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**PUBLIC HEALTH ADMINISTRATION IN
RICHMOND, IND.**

**A REPORT OF A SURVEY TO DETERMINE THE
INCIDENCE OF TUBERCULOSIS**

BY

J. C. PERRY

Senior Surgeon, United States Public Health Service

SUPPLEMENT No. 26

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PUBLIC HEALTH ADMINISTRATION IN
RICHMOND, IND.

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PUBLIC HEALTH ADMINISTRATION IN RICHMOND, IND.

On account of the local reputation of Richmond, Ind., for having a greater number of cases of tuberculosis than many other cities of the same size and for suffering to a greater extent from this disease than should be expected in a city so well built and having comparatively no slums, the city officials and different civic organizations united in a request to the Surgeon General of the United States Public Health Service for the detail of an officer to make a study of general public health administration in the city and a thorough investigation of existing conditions in order to determine whether an unusual amount of tuberculosis existed.

Richmond is an attractive and prosperous city of 24,529 inhabitants and is reputed to be one of the most wealthy for its size in the United States. It is divided by the White Water River into an older and larger eastern section and a smaller and newer district to the west of the river. The eastern part can be subdivided into three sections: (1) The oldest district, extending from North Second to North Seventh Street, inclusive, and also embracing the territory from South First to South Twelfth Street, inclusive; (2) the section north of the railroad, and situated between that and the river, name Riverdale; (3) the largest area, extending from North Eighth to North Twenty-second Street and on the south side from Thirteenth Street to Twenty-third Street. Further reference will be made to these sections in the chapter on "Tuberculosis survey," especially relative to housing conditions and the economic status of the residents.

There are several manufacturing industries of considerable magnitude located along the railroad and on the eastern bank of the river, which furnish employment to a large per cent of the laboring class. The more important factories are those manufacturing automobiles, pianos, harvesting machinery, hardware and agricultural tools, underwear and gloves.

This report gives the result of studies both from records and in the field conducted over a period of three months. These studies are best considered in the following general order: (a) The health department and the activities under its control and direction; (b) tuberculosis survey; (c) public health work by other agencies.

Acknowledgment.—Many courtesies were extended and much information was furnished by officials and others during the course of the study, and acknowledgment is made to the following:

The secretary of the State board of health, for appointment of the writer as an acting State health commissioner, so that the work should have a legal status if any vexed questions arose during the study, and for use of the records of his office and other information; the health officer of Richmond, for information, use of records, and assistance; inspectors of the board of health, for information and data; members of the medical profession, for report of cases of tuberculosis; the secretary of the social-service bureau, for use of statistical data and records; the public health committee of the Commercial Club, for suggestions and offer of assistance, and especially the secretary of the club, for much general information, valuable assistance, and many courtesies; the executive committee of the womens' clubs, for information and record of cases of tuberculosis under the care of the visiting nurse; the superintendent of schools and school physicians, for data; and, lastly, the citizens of Richmond, whose courtesy made the tuberculosis survey possible.

Health Department.

The creation of local boards of health is prescribed by the law establishing a State board of health, and it is deemed necessary only to refer briefly to those sections relating to city boards of health in order to have a correct understanding of the duties and powers of the health officer of the city of Richmond.

Board of health.—It is provided that every incorporated city may have a board of health composed of three commissioners, two of whom shall be physicians skilled in hygiene and sanitary science. The members are appointed by the mayor of the city for a term of four years. The board appoints as secretary a physician, who may or may not be a member of the board, and he is the executive officer of the board and in reality the health officer of the city.

Compensation.—The salary of the city health officer is fixed by law at 2 cents per capita per annum for each person residing in the city, and such salary shall not exceed \$1,500 per annum. The compensation of the health officer of Richmond is \$500 a year. The salary of members of the city board of health, other than the secretary, is such as the city council may determine, and at present is \$60 per annum.

Powers and duties.—It is the duty of the health officer to enforce the health laws, ordinances, and regulations of his own and superior boards of health; to collect, record, and report vital statistics within his jurisdiction; to keep records and minutes of the board of health; and to make monthly report of the work performed. The health

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officer has the power to order what is necessary and reasonable for the control of communicable diseases and to establish such quarantine as he may deem necessary for the prevention and suppression of disease. He also has the power to make inspection and sanitary surveys of all public buildings and surveys of private property after formal notice.

It is the duty of the health officer to cause the abatement of any condition that may cause or transmit disease or that is prejudicial to the public health, and it is unlawful for any person, firm, or corporation to permit or maintain any such condition. If the responsible party neglects or refuses to obey an order from the health officer for abatement of the nuisance, proceedings in the courts may be instituted against the offenders for enforcement.

The health officer has immediate control and direction of the city sanitary police force, meat inspectors, and dairy inspectors.

Authority of State board.—All health commissioners and health officers in the State are under the jurisdiction of the State board of health, and must carry out the regulations promulgated by said board. The State board has the power to discharge any health officer for intemperance, failure to collect vital statistics, obey rules, keep records, make reports, or for neglect of official duty, provided, however, that the health officer has received due notice and has been accorded a hearing. Right of appeal is also granted.

Health officer.—As already stated, the health officer is a part-time official, and for administering the public-health activities of the city receives the small salary of \$500 per annum; therefore, he must rely on his private practice for securing an adequate income, and under such circumstances little blame can be attached to him if his private practice takes precedence over his public-health work. No provision is made for clerical assistance and no central health office exists. Reports are received at his private office, where the records of births and deaths are kept. Records of the other activities are kept by the inspectors either at their homes or office. Monthly statements of work accomplished are made to the city council and an annual report is submitted to the mayor. The position is not under civil service and the occupant of the office is subject to change with that of the city administration.

Full-time health officer.—The system now practised is unsatisfactory and the same results in public-health work can not be accomplished by a part-time officer as by one who can devote all his time and attention to such work. There is no greater asset to a community than the conservation of the health of its citizens, and each year this fact is being more forcibly emphasized, and an awakening to the necessity for a more thorough prosecution of public-health activities is taking place. A full-time health officer is essential

for the accomplishment of results in the field of preventive medicine and for placing public-health work on the plane which its importance demands.

Richmond can well afford a full-time health officer, and certainly Wayne County and the city combined could utilize the services of such an official to marked advantage. However, this is not feasible under the present law. On account of the importance of the measure it can not be too earnestly recommended to all citizens to support the State board of health in its endeavors to have a law enacted authorizing full-time county health officers.

Health department activities.—There are employed three full-time inspectors and a superintendent of the garbage incinerator; and as their duties are in connection with specific activities, they will receive attention in the proper place. The work of the health department will be considered under the following heads: (1) Communicable diseases, (2) food inspection, (3) sanitary inspection, (4) vital statistics, and (5) garbage collection and disposal.

Communicable Diseases.

Regulations.—The regulations governing the report, control, and quarantine of communicable diseases are those prescribed by the State law and those promulgated by the State board of health. The reportable diseases are: Diphtheria, scarlet fever, smallpox, typhoid fever, tuberculosis, poliomyelitis, epidemic cerebrospinal meningitis, cholera, plague, typhus fever, leprosy, measles, chicken-pox, and whooping cough. Tuberculosis and typhoid fever are reported for statistical purposes only and are not quarantined; measles, chicken-pox, and whooping cough are placarded in order to warn the public that said diseases exist on the premises, and absolute quarantine is not required.

The immediate report to the local health officer of any of the communicable diseases mentioned herein is required of physicians called upon to attend them and of any other person who knows or has reason to believe that such a disease exists in any member of his or her family.

The health officer, upon receipt of notification of the existence of any of the communicable diseases specified, shall immediately, in person or by deputy, quarantine the house, rooms, or premises in which said disease exists so as effectually to isolate the case or cases, and the family if necessary, in such manner and for such length of time as may be necessary to prevent transmission of the disease.

A placard giving the name of the disease and quarantine order is posted in a conspicuous place on the house or rooms placed in quarantine. Disinfection and cleaning of premises are required in accordance with the rules and methods prescribed by the State board

of health after termination of the case either by recovery or death.

Children suffering from a quarantinable disease and those exposed to infection must be excluded from school and are prohibited from appearing in public places. Parents, guardians, or persons having custody of any such children are enjoined to enforce this provision, and teachers are required to exclude such children from school, unless a written permit to attend is given by the health officer. It is the duty of the health officer to ascertain what school children suffering from communicable diseases and what children from infected premises attend, and to notify those persons in charge of such schools to exclude them.

The health officer, knowing of or suspecting the existence of any communicable disease dangerous to the public health, there being no physician in attendance, or one who fails or refuses to immediately report such case to the health officer, is required to immediately examine the case or cases, and if in his judgment they should be isolated and quarantined in a building set apart for the care and treatment of persons suffering with said communicable disease, he is empowered to remove such person or persons to this building.

In all cases of death from cholera, plague, typhus fever, smallpox, diphtheria, scarlet fever, and cerebrospinal meningitis the funeral must be private and the burial made within 24 hours. No person is permitted to enter the house containing the remains except the undertaker and assistants, unless by permission of the health officer.

Morbidity reports.—Reports of the notifiable diseases are made to the health officer, generally by telephone, although written report may be forwarded. The following data are furnished: Name and address of the patient and the disease from which suffering. These are copied in the register of communicable diseases and, with the date of occurrence and name of physician reporting the same added, constitute the only record kept. An examination of the register showed that for some years only a synopsis of the number of cases of communicable diseases reported was made by months, no data being given as to the section of the city in which the cases had occurred. It certainly seems essential to have such data in the case of typhoid fever.

Methods of control.—Upon being notified of the existence of a case of communicable disease the health officer directs the sanitary inspector to placard the house with the prescribed card, which has the name of the disease displayed in bold type and statement of penalty for violation of quarantine. The inspector instructs the family relative to receiving milk and other supplies, and advises, when the disease is diphtheria or scarlet fever, that no milk bottles be allowed to leave the premises until termination of quarantine. No investigations are made and no instructions given as to the care and disposal

of secretions and excretions from the patient. In fact, the inspector is incapable of rendering such advice, and the necessary knowledge is not to be expected in an untrained employee. Subsequent visits are seldom made by the inspector, and a proper check is not maintained to determine whether quarantine has been observed. With the nailing up of the card the activities of the inspector in connection with the case generally cease until terminal disinfection is required. Cases of typhoid fever are investigated by the health officer as to water and milk supply and whether the disease was contracted in the city or elsewhere. The presence of surface wells from which water may have been used receives special attention and the presence of privy vaults and flies as a causative factor is considered.

Quarantine.—The management of quarantine is left to the attending physician, and this procedure as a rule embraces the entire family, although breadwinners are allowed to continue their vocation by living away from home. Thorough isolation of the patient either with a trained attendant or some member of the family in rooms especially set aside for their exclusive use, thereby permitting the other members of the family to come and go without restraint, does not seem to have received attention.

It is now known that secretions from the noses and throats of patients suffering from scarlet fever and diphtheria are the important factors in spreading infection, and that if thorough isolation is practiced and all articles used by or in connection with the patient are thoroughly disinfected before being allowed to leave the room there is practically no danger of spread of infection from such a household by allowing liberty to other members of the family. It would seem feasible to institute such a quarantine in many cases, and if properly conducted this would be effective in preventing the spread of the disease and to a large degree mitigate the harshness of the procedures otherwise necessary to properly safeguard the public health.

A strict quarantine is prescribed in cases of diphtheria, scarlet fever and smallpox, and it is deemed advisable to briefly consider the salient requirements in these diseases.

Diphtheria.—In this disease the patient is not generally released until cultures, made from secretions of nose and throat, are negative, although in some instances he is released without this requirement when the case has been mild and all clinical manifestations have disappeared. Children associated in the family with the patient are quarantined until termination of the case, but those children who receive an immunizing dose of the antitoxin and live away are released. Adult members of the family are released provided they live away from the premises in which the patient is quarantined. No cultures are made from contacts.

Scarlet fever.—The quarantine of the patient is specified at 21 days, but in practice this period may be shorter or longer. Children living in the house with the case are quarantined for the same length of time, but when removed to another home they are released after 10 days from last exposure. The same rule applies to adult members as specified in diphtheria.

Smallpox.—Hospitalization of the patient is recommended, as far as practicable, but is not compulsory. The quarantine period of the patient is 21 days from commencement of the disease or until the subsidence of all symptoms and the falling off or removal of all crusts and scabs, and after disinfection of the patient and his clothing. Persons exposed to infection are quarantined for 14 days unless they are protected by a previous attack of the disease or a recent successful vaccination. Those who submit to vaccination are released after disinfection of person and clothing, when such vaccination is shown to have been successful.

Other diseases.—Quarantine in the less frequent diseases of cerebrospinal meningitis and poliomyelitis is as follows: For the patient suffering from the former, isolation from the rest of the family for 14 days; from the latter, isolation and quarantine for 28 days.

In measles, whooping cough, and chicken-pox, only the patient suffering from the disease is quarantined, but children in the family must not attend school and public gatherings or mingle with other children, unless satisfactory proof can be furnished the health officer that they have had the disease, when, in his discretion, he may release them from such restriction.

Termination of case.—The attending physician advises the health officer when the case is ready for termination, and the sanitary inspector disinfects the premises when called for and removes the placard. The school authorities are notified by the health officer when the patient and children of the household may be admitted to school.

Disinfection.—Terminal disinfection of the entire house is performed after diphtheria, scarlet fever, and smallpox, and of the room or house after cerebrospinal meningitis, also after typhoid fever and tuberculosis upon request. The attending physician determines the time for disinfection, based upon the termination of the case in accordance with prescribed regulations.

The method employed is by vaporizing paraformaldehyde which is contained in a tin box with a lamp attachment. Two size boxes are used, and as they are labeled with the number of cubic feet of space that can be disinfected by the contents, there is the advantage of simplicity for an untrained inspector, and this method is probably as efficient as any other. The family are advised to thoroughly scrub the exposed woodwork and air the house.

Laboratory aid.—Cultures and specimens for diagnostic purposes and those required for termination of cases of diphtheria are sent to the laboratory of the State board of health. The result of the examination is generally received the following day.

Isolation hospital.—The city has a small isolation hospital consisting of three detached wooden buildings. The central building is occupied as quarters by the custodian and his family; that on the front of the lot is the hospital for cases of scarlet fever and diphtheria; and the third building, on the rear of the premises, is for the reception of cases of smallpox. There are six rooms, of two beds each, available for scarlet fever and diphtheria and accommodations for eight cases of smallpox. However, there is ample space for 12 if an unusual number of cases of smallpox requires isolation.

The equipment of the building is only fair, but probably ample for the limited use made of it, as only three cases of scarlet fever and one case of smallpox were cared for in the institution during 1914. When cases are isolated at the hospital a nurse is provided, the medical attention is furnished by the health officer, and the subsistence is supplied by the custodian for a specified price per meal, the total expense being paid by the city. This primitive arrangement has the advantage of economy and may meet the limited requirements, but such an institution does not fulfill the purpose of an isolation hospital of to-day, and such establishments prevent the term "pesthouse" from becoming obsolete.

The hospital is located in the line of extension of one of the principal streets and eventually will have to be abandoned. The expenditure of any large sum, therefore, for the repair of the buildings would be unwise. However, it is incumbent on the city to build and satisfactorily equip an isolation hospital in some other locality in order to provide a suitable institution for isolation and treatment of persons suffering from quarantinable diseases, especially cases of diphtheria, scarlet fever, and smallpox, that can not be satisfactorily isolated at home.

Antitoxin.—Diphtheria antitoxin is supplied free of charge to those requiring it and too poor to purchase the same, under the following conditions: Prescribed blanks of which the health officer has a supply must be filled out, giving the county, township, name, and address of the parent, guardian, or householder; name, age, and sex of the child or person who is to be treated for diphtheria or immunized; whether microscopical examination for diphtheria has been made; and the amount of antitoxin desired. The physician receiving it must sign an affirmation to the effect that the person is too poor to pay for the antitoxin.

The table on page 11 shows in concise form the handling of communicable diseases in Richmond, Ind.

Handling of communicable diseases.

Disease.	Period of quarantine—		Exclusion from schools.		Detention of other members of family— Breathwiners.	Terminal disinfection.
	For patient.	For contacts.	Patient.	Contacts.		
Diphtheria.....	Until one negative culture.	When associated with patient same length of time. If given immunizing dose of antitoxin and living away from home, none.	Until medical certificate is furnished that bacteriological examination shows freedom from infection.	7 days after release from quarantine, unless an immunizing dose of antitoxin has been received. Under latter circumstances no exclusion.	None if they live away from house in which patient is quarantined.	Yes; house.
Scarlet fever.....	21 days or until desquamation is complete; may be less in discretion of health officer.	Same as for patient; when they move to other premises, 10 days.	10 days from termination of quarantine.	Same as for patient—10 days after removal to other premises.	Same as in diphtheria.	Do.
Smallpox.....	21 days or until subsidence of disease and all crusts and scabs have fallen off.	14 days unless successfully vaccinated, when they may be released if "good take" has occurred.	7 days after termination of quarantine.	Until released from quarantine.	Until released from quarantine.	Do.
Measles.....	14 days.	None.	5 days after termination of quarantine.	Same as patient unless have had the disease; then no exclusion.	None.	None.
Whooping cough.....	5 weeks.	do.	For period of quarantine.	do.	do.	Do.
Chicken-pox.....	14 days.	do.	Period of quarantine.	14 days, unless have had the disease; then no exclusion.	do.	Do.
Typhoid fever.....	None.	do.	Time of illness.	None.	do.	Upon request.
Cerebrospinal fever.....	Isolation for 14 days.	None; persons in household not to mingle with general public.	Until termination of quarantine.	During quarantine period.	No detention of breathwiner.	Yes.
Epidemic poliomyelitis.	Isolation for 28 days.	At discretion of health officer.	Period of quarantine.	14 days.	No detention of breathwiners, if precautions are observed.	Do.

Occurrence of Important Communicable Diseases.

The following table is presented to show the occurrence in Richmond, Ind., of certain important communicable diseases during a period of five years:

Comparison and total number of cases of diphtheria, scarlet fever, smallpox, typhoid fever, and measles, by months, for 1910, 1911, 1912, 1913, and 1914.

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total cases.	Total deaths.
Diphtheria:														
1910.....	0	0	0	2	3	10	1	2	0	2	2	1	23	5
1911.....	5	6	4	4	1	1	2	0	4	3	2	0	32	4
1912.....	0	0	1	0	0	2	3	1	0	2	1	0	10	0
1913.....	0	0	0	0	1	0	0	0	0	0	0	0	1	0
1914.....	2	2	0	1	0	0	6	6	6	1	7	3	34	2
Scarlet fever:														
1910.....	15	4	5	4	7	5	2	2	1	3	0	1	49	1
1911.....	0	1	3	4	7	1	1	3	1	1	0	0	22	5
1912.....	1	1	3	3	0	11	13	13	19	28	44	44	180	5
1913.....	50	32	34	32	54	20	12	10	20	22	12	14	312	9
1914.....	19	4	18	7	9	9	5	5	4	6	5	3	94	1
Smallpox:														
1910.....	1	0	0	0	0	0	0	0	0	0	0	0	1	0
1911.....	5	7	2	0	34	12	0	0	0	0	1	0	61	0
1912.....	1	0	0	0	0	0	0	0	0	1	0	0	2	0
1913.....	1	0	0	0	0	1	0	0	0	0	0	0	2	0
1914.....	1	0	1	0	0	0	0	0	0	0	0	1	3	0
Typhoid fever:														
1910.....	5	0	0	0	0	0	2	0	2	2	8	2	21	3
1911.....	2	2	0	0	0	0	4	8	7	3	2	6	32	3
1912.....	1	0	0	0	0	2	4	1	12	8	2	4	34	2
1913.....	1	0	0	1	1	0	1	4	11	40	6	2	67	6
1914.....	6	0	0	0	1	1	2	1	5	8	11	1	36	2
Measles:														
1910.....	1	0	11	29	150	103	16	1	0	0	1	1	313	1
1911.....	1	5	16	21	32	21	6	0	0	0	0	0	102	0
1912.....	0	0	3	6	10	3	0	0	0	0	0	0	22	0
1913.....	23	66	287	103	12	3	1	1	0	0	0	3	499	3
1914.....	1	1	0	3	1	2	0	3	1	1	1	3	17	0

Deductions.—A study of the statistics permits certain deductions to be made regarding the reporting and management of the communicable diseases specified.

Diphtheria.—In 1910 there were reported 23 cases of this disease with 5 deaths, a mortality rate of 21 per cent. The case-fatality rate in 1911 was 12 per cent, and in 1913 only 1 case of diphtheria was reported, although it was an unusual year for the prevalence of other communicable diseases. The mortality rate for the two years noted is far above normal for this disease and indicates that not all cases of diphtheria occurring during that period were reported. The one case for 1913 indicates either a phenomenal condition or that physicians were derelict in reporting their cases. The management of diphtheria is faulty, as no cultures are made from contacts in order to detect carriers, and cases are at times terminated without cultural methods.

Scarlet fever.—In 1912 there was an undue prevalence of this disease which assumed epidemic proportions in the following year. Commencing June, 1912, and continuing until February, 1914, the

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morbidity rate from scarlet fever was unusually high, and the inference is that either mild cases were not recognized and reported or that the quarantine enforced was decidedly lax. A study of the statistics for the five-year period shows that the notification of this disease is much better than that for diphtheria, but the death rate indicates that many mild cases are not reported.

Smallpox.—A study of the statistics showed that there were 68 cases of smallpox in 1908, 138 cases in 1909, and 61 cases in 1911. This gives an actual number of cases equal to those occurring in cities many times the size of Richmond, and shows an unduly high prevalence of this disease. The high morbidity from smallpox during the first two years specified indicates that some of the early cases were not reported, and that prompt and effective isolation was not practiced. Compulsory hospitalization of all smallpox patients should be carried out and there should be suitable hospital facilities for this purpose. The record for the past three years is satisfactory, and indicates a better notification and management of this disease.

Typhoid fever.—The data presented show a higher morbidity rate from typhoid fever than ought to exist. The main water supply is safe and therefore other operative factors must be sought. The disease generally commences in July and increases through August and September, reaching its maximum in October or November, and declining during December and January, until the lowest point is reached in February or March.

There are a number of shallow wells in certain sections of the city, and a number of cases of typhoid fever at different times have been traced to the use of water from such wells. The health officer states that his investigations showed that one half of the cases of this disease that occurred in 1914 were contracted from three contaminated wells. The sharp outbreak in September and October, 1913, was milk borne, due to washing cans with water that had become infected. The health officer promptly investigated the outbreak and found that all the cases were occurring in persons receiving milk from a certain dairy, and he naturally attributed the causative factor to this milk supply. An examination of the dairy premises showed that water was piped from a spring to the milk house, through terra-cotta pipe laid in a shallow trench, the sections being only placed end to end and not cemented, so that surface water readily gained access to that taken from the spring. The source of infection was a surface privy situated on a hill sloping toward the pipe line. Removal of the terra-cotta pipe and the installation of iron pipe, with properly caulked joints, with removal of the privy, remedied conditions, and the outbreak promptly subsided.

As a large percentage of the cases of typhoid fever occurs during the months when flies are most numerous, these insects must be

regarded as a factor. Shallow privy vaults and insanitary privies, none of which are fly proof, exist in all sections of the city, and are particularly numerous in those districts furnishing the majority of cases of typhoid fever. Given an opportunity to come in contact with the excreta from a case of this disease, flies constitute an important causative agent. Furthermore, as many of the cases are not under the care of a trained nurse, proper prophylactic measures are not always carried out, and direct contact becomes a factor in the continuation of the disease.

All three of these factors being operative, the remedy to apply is apparent: (a) It should be obligatory on owners to install the necessary plumbing in houses and connect with the water and sewer systems when the same are available, and wells and privies on such premises should be filled and closed; (b) when water and sewer connections are not possible, fly-proof privies should be built and maintained and wells constructed so as to prevent contamination; (c) the extension of the water and sewer systems as soon as possible, so that connections will be accessible for all houses; (d) the employment of a trained nurse, who, in addition to other duties, could visit cases not under proper care and supervise the carrying out of prophylactic measures; and (e) the vigorous prosecution of the campaign against flies, in order to reduce the number to as low an index as possible.

Measles and whooping cough.—Except during two years of the period studied, there have been a considerable number of cases of measles, and the report of cases of this disease appears to be more satisfactory, although many mild cases probably do not come under the care of physicians and their occurrence is not reported. A study of the statistics showed no record of notification of cases of whooping cough for a consecutive period of five years prior to 1912, and as only five cases of this disease were notified in 1914, it is readily seen that little or no attention is given to the reporting of this disease.

Public health nurse.—It is believed that the employment of a nurse by the health department would result in a more satisfactory management of communicable diseases. She could visit households after the establishment of quarantine, see that isolation or quarantine is maintained, and give instructions relative to the disinfection of excretions from the patient and of articles used by or in connection with the sick. As the number of cases of the quarantinable diseases would not require all of her time, the nurse would be able to supervise prophylactic measures in typhoid fever cases and also do "follow up" work in homes where tuberculosis sufferers are present. She would be an important factor in teaching personal hygiene and the observance of the general principles necessary to prevent the spread of infection. The cost to the city for this additional employee

would be small and the benefits accruing would considerably outweigh the expenditure.

The sanitary inspector should be retained and this employee should devote all his time to sanitary inspection work. Inspections of premises to insure proper containers for garbage and care of this household waste with proper receptacles for trash; inspections of stables and manure boxes and privy vaults; and investigations of complaints and nuisances will provide sufficient work to keep one employee busily engaged.

Food Inspection.

The inspection of foods is one of the most important functions of a local health department and Richmond is progressive in this respect. The subject is best considered under the following heads: (a) Control of milk supply, (b) meat inspection, and (c) sanitary food inspection.

Ordinances and regulations.—The ordinances operative are both State and municipal, and although the inspectors of the State board of health are entrusted with the enforcement of the regulations governing the construction of food-producing establishments and the sanitary maintenance of them, as well as proper care of the manufactured products, the local health officer and, by his authority, the local inspectors are also authorized to act in this capacity, and the work of the latter is cooperative with that of the former. The regulations governing places in which food is prepared are summarized as follows:

Every building, room, basement or cellar occupied or used as a bakery, confectionery, cannery, dairy, creamery, packing house, slaughterhouse, meat market, grocery, hotel, restaurant, or other place used for the preparation or sale, manufacture, storage, or distribution of any food product must be properly lighted, ventilated, drained, and plumbed and conducted in so sanitary a manner as to insure the healthfulness of the employees engaged therein and the wholesomeness of the food produced in said establishment.

Side walls and ceilings of every such place shall be well plastered, wainscoted, or ceiled with lumber or metal, and shall be oil painted or kept well lime washed. The floors, walls, and ceilings shall be kept clean and in a sanitary condition. All trays, racks, boxes, baskets, buckets, and all machinery and utensils used must be kept clean.

All food products in process of manufacture, preparation, storing, sale, distribution, or transportation must be protected against contamination from dust and flies; and all food-producing or distributing establishments shall have the doors, windows, and other openings fitted with screens during the fly season.

Floors must be of impermeable material or wood and capable of being flushed and washed clean with water.

Persons sick with any venereal or communicable disease are not allowed to work in places where food is manufactured.

Control of the Milk Supply.

The city board of health, through its inspector, exercises general supervision over dairies, milk depots, and methods of handling milk and milk products; and the requirements relative to the production, handling, and sale of milk are prescribed in the general regulations of the State board of health and by a specific municipal ordinance.

An abstract of the ordinance and regulations is presented as follows:

Buildings used for stabling cows for dairy purposes shall be well lighted and ventilated, and be provided with a suitable solid floor of wood, cement, or other impervious material that can be readily cleaned and properly drained.

No water-closet, privy, cesspool, urinal, inhabited room, or workshop shall be located within any building or room used for stabling cows or for the storage of milk or milk products; and other animals shall not be kept in such rooms. Stables shall be kept clean, be whitewashed once a year, and the manure must be removed daily.

All milk must be removed, as soon as drawn, to the milk room, which must be separate from the stable and used exclusively for the handling and keeping of milk and cream. The milk house shall be sanitary, screened, properly ventilated, and have suitable facilities for straining, cooling, and storing milk or milk products, and for washing and sterilizing all utensils and apparatus used in handling the milk.

All cans, pails, bottles, strainers, measures, coolers, dippers, or other utensils or apparatus must be cleaned from all remnants of milk and scalded with boiling water or live steam after each use and before any milk is placed in them.

Milk must be strained and cooled to 60° F., or below, within one hour after milking, kept at that temperature until it leaves the farm, and, if retailed to the consumer, until delivered.

All milk or cream cans delivered to creameries or dealers in cities must be covered with tightly fitting lids.

It shall be unlawful for any person, firm, company, or corporation to sell or offer for sale for human consumption any milk or cream without first procuring a license from the city to do so, which license shall be issued by the dairy inspector on written application therefor.

No person himself, or as agent of another, shall sell, deliver, or have in his possession with intent to sell or deliver milk to which water or any foreign substance has been added; which has been skimmed; is not of standard quality; that which is produced by diseased cows or by cows which have been fed unwholesome food; or which has been produced, stored, handled, or transported in an unclean or insanitary manner.

Milk not of standard quality shall mean milk having less than 8.5 per cent of solids, not fat, and less than 3.25 per cent of milk fat, and cream having less than 18 per cent of milk fat. Skimmed milk having less than 9.3 per cent of milk solids, exclusive of fat, shall be considered adulterated. The sale of skimmed milk is not prohibited, provided the receptacle containing the same is plainly labeled or marked "Under standard milk."

Cows which react to the tuberculin test are considered diseased under the terms of the ordinance; and milk produced at a dairy or place which scores on the national dairy division score card below 50, and milk sold from or by a city plant which scores below 70, shall be considered as produced or handled in an unclean and insanitary manner.

Milk from a cow 2 weeks before calving and 10 days afterwards is considered unsanitary. The ordinance requires that milk shall be kept at a temperature not above 60°, and that if it contains more than 500,000 bacteria per cubic centimeter it shall be regarded as insanitary.

No person shall give, furnish, sell, or offer for sale any milk, cream, or skimmed milk within the city, directly to consumers, in any quantity of 1 gallon or less, except in glass bottles or jars, sealed with air-tight tops or stoppers of an approved design, or other bottles or jars approved by the health officer.

No person shall bottle, cause or allow to be bottled any milk, cream or skimmed milk upon any wagon or other vehicle or any other place except at a regular milk room of a dairy, creamery, or other place where milk is prepared for delivery, the sanitary condition of which has first been inspected and approved by the dairy inspector or the health officer. Furthermore, it is prohibited to transfer any milk from one receptacle to another upon any street, alley, or thoroughfare, or in any building other than specified above.

The license is issued under the condition that the person to whom granted shall observe and carry out the provisions of the ordinance and the regulations of the State board of health; that all information as to places of residence of persons from whom milk is purchased to be sold in the city shall be furnished the dairy inspector.

This inspector has the right to inspect all dairies and examine places where milk is prepared for sale and delivery, as well as all vessels and utensils used therein. Also to inspect dairy cows and examine and subject to test all those that he may believe diseased. In event the licensee violates the provisions of the ordinance and does not conform to the prescribed regulations, the license can be revoked by the dairy inspector.

A person suffering from a contagious disease, or in whose residence a case exists, must not engage in producing, handling, or distributing milk; and when such a disease exists in said person or among his employees or in any buildings used in any way in the milk business, no milk shall be sold or delivered from such dairy or milk establishment, except by permission and in the manner prescribed by the health officer. Every milk dealer must promptly report the occurrence of any communicable disease among his employees or their associates or families to the health officer.

No one shall deliver milk or remove empty milk bottles or receptacles from a dwelling where any communicable disease exists until authorized by the health officer and in the manner prescribed.

An inspector who is a graduate veterinarian is engaged in the supervision of the milk supply and in addition to this duty also performs sanitary food-inspection service in one of the two districts of the city; but, as the latter work is not extensive in a small city with a limited business section, he has ample time to perform satisfactorily the combined duties.

The control of the milk supply is best considered in the following order: (a) Dairy inspection and (b) milk depots.

Dairy inspection.—There are 44 dairies, milking about 550 cows, supplying milk to Richmond. They are located from 1 to 5 miles from the city and therefore are easy of access for inspection purposes. Dairies are inspected and scored once in three months, and such scores are published in the local papers. This publicity has the

advantage of stimulating the dairymen to maintain satisfactory conditions in order to receive a good score and thereby create a more favorable impression on the consumers.

The score card used is that prescribed by the United States Bureau of Animal Industry. The actual conditions present in several dairies inspected were compared with the values given on their score cards, and it was found that the scoring of dairies is satisfactory, that actual conditions and methods formed the basis, and that judgment markings were not an appreciable factor.

A study was made of the scores of 34 dairies with the following result: The lowest score was 51 and the highest 94; 4 were under 60; 19 scored from 60 to 70; and there were 11 over 70. It was noted that the herds of only two producing farms had been tuberculin tested; that only four dairies used small top milk pails; that one used patent milkers; and that scalding of cans, buckets, and utensils, prompt removal of milk from the stable to the milk house, and proper cooling of the milk were general.

The cow stables on 40 of the farms have cement floors with good drainage, and the seven that were visited were found in good condition and clean with one exception, and sufficiently ventilated and lighted except in one instance. The stables for cows used for dairy purposes are above the average both in construction and cleanliness. Seven herds were inspected, and the cows were found clean and in good condition.

Proper attention is paid to cooling the milk both at the farm, in the milk house, and during transportation, and all the dairies have good scores in this particular. There are numerous springs in the country, and the majority of the dairies are able to utilize this source of supply in their milk houses, and by constructing a shallow cement trough, effective cooling is obtained by placing the cans of milk in the flowing stream of water. When this is not available, cold storage rooms are constructed and ice is used. Most of the milk is cooled in the cans, and only a few dairies use coolers for this purpose. More than one-half of the dairies deliver their milk direct to the consumer, and the milk house is equipped with a small bottling apparatus for this purpose, as all milk in quantities of 1 gallon or less can only be sold bottled. Milk in larger quantity is delivered in cans with tightly fitting covers direct to milk depots, hotels, restaurants and creameries. Milk houses have the doors and window openings screened during the summer months. As the distance from the farm to the consumer is short and delivery is made early in the morning, there is not much rise in the temperature of the milk in cans, although ice is generally used in the summer, but bottled milk must be kept cool by packing ice around the bottles. A number of dairy wagons were inspected, and it was found that this

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provision is generally carried out. The capping of bottles is done by hand.

Milk depots.—These are really bottling plants, as most of the milk is so treated for delivery to consumers, although milk in bulk is sold in cans to hotels and restaurants. Most of them are small, handling from 40 to 100 gallons daily, and the majority are located in the country near the city. These depots are inspected once a month, but are not scored. It certainly seems advisable to score such establishments as to equipment and methods, and to publish their records, as is done in the case of dairies. There are only 10 in operation, and 4 of that number were inspected. The rooms were properly constructed with cement floors, screen doors and windows, and equipped with necessary apparatus for washing and bottling. Those visited were clean, well lighted, and ventilated, and free from flies, and were found to be in a satisfactory condition. Capping of bottles is done by hand. A limited amount of milk is sold in grocery stores, but only in bottles, and it must be kept in a separate compartment of a refrigerator.

Pasteurization.—Formerly there was one small pasteurizing plant in operation, equipped with a flash-type apparatus, but pasteurization was discontinued three months ago. Although waiting for the purchase and installation of new apparatus, in the meantime milk is being bottled and sold under a cap which says "pasteurized milk"—it not having been deemed necessary to change the label by securing different caps. At the present time none of the milk from dairies supplying Richmond is pasteurized.

Taking into consideration that few herds are tuberculin tested; that great difficulty would be encountered in enforcing this provision; and that the communicable diseases of typhoid fever, scarlet fever, and diphtheria are often spread through contaminated milk, a wise regulation would be one requiring pasteurization of all market milk. However, the application of such a requirement to a small city can not be easily obtained, and the standards for raw milk should be made sufficiently high to insure a safe supply.

Collection of samples.—At present milk samples are collected at infrequent intervals—about once a year—and the last examination showed that the milk from only two dairies fell below the standard prescribed by the ordinance. While the collection of samples should not be expected to be as frequent as when a laboratory is at hand for conducting the examinations, still the laboratory of the State board of health can be utilized, and it seems that samples for both chemical and bacteriological examinations should be collected from each dairy and milk depot at least every three months. Such examinations are essential for a proper supervision of the milk supply, and the determination whether the milk conforms to ordinance requirements can

be effected only in this way. The results of these examinations would furnish a useful guide to the inspector in instituting measures for improved conditions, and their publication, together with the score of the dairies, would prove a potent lever on the dairymen.

Deductions.—Several of the dairies are in excellent condition, and taken as a whole they are above the average. The inspector is conversant with his duties and a satisfactory inspection service is maintained. It is recommended that milk depots be scored and that samples for both chemical and bacteriological examination be collected from every dairy and milk depot at least every three months.

Meat Inspection.

A meat-inspection service is maintained and one full-time inspector is employed for this purpose. A satisfactory local ordinance exists regulating the slaughtering of certain animals for human food and for the inspection of such animals and their carcasses in order to insure that meat and meat products produced, manufactured, or offered for sale in Richmond are satisfactory and fit for human food. It is unlawful for any firm, corporation, or person to either directly or indirectly sell or offer for sale for human food any carcass or part thereof of cattle, sheep, or swine unless the same has been inspected and passed by the inspector designated for that duty.

Animals are inspected before slaughter, and any that show symptoms of disease are set apart and either condemned or slaughtered separately and in a manner prescribed by the inspector. A post-mortem examination is made of all carcasses and parts thereof, and those found healthy, wholesome, and fit for food are stamped "Inspected and passed." Those found diseased or unwholesome are marked "Condemned," and destroyed or rendered impossible of use for food.

Inspection is made of all meat used in canning, packing, or other meat-products establishments, and the meat must be inspected and passed before it can be brought into any department wherein the same is to be treated and prepared for meat products. The meat inspector has right of access at all times to any such establishment.

Another duty of the meat inspector is supervision of the sanitary condition of slaughterhouses and meat-products establishments, and inspections are made at frequent intervals, in order to determine existing sanitary conditions and if the requirements of the board of health are being complied with. If insanitary conditions exist to the extent that meat and its products are rendered unclean or otherwise unfit for food, such meat is condemned.

Slaughterhouses.—With the exception of a limited quantity of meat received from Chicago and Indianapolis, the meat supply of

Richmond is slaughtered in the two local slaughterhouses. The larger of these, besides supplying the local market, is engaged in interstate trade, and therefore is under the supervision of a Government inspector. In the other, owners of meat markets in the city slaughter animals for their trade, and no export business is done from this house. This is under control of the meat inspector of the city board of health.

All animals are inspected before slaughter and a careful post-mortem examination is made of all carcasses. The meat found free from disease and fit for human food is stamped "Inspected and passed," and that condemned is rendered for grease in the rendering tanks connected with the establishment.

The general sanitary condition of the different parts of the slaughterhouse is under the control of the inspectors and the necessary cleanliness is maintained. A careful supervision is exercised not only over the animals slaughtered but also over the general condition of the establishment.

Both slaughterhouses were carefully inspected and found in the main properly constructed, clean, and in good sanitary condition. In one impervious floors are needed in a room used for slaughtering hogs and in that used for manufacturing meat products. The floors of the killing pens are of cement, the cooling rooms were clean and properly constructed, and windows and door openings in rooms used for manufacturing meat products were fitted with proper screens to prevent the entrance of flies. The gases from rendering tanks are taken care of in one house by passing them through a condenser and in the other by combustion.

It is believed that meat inspection is carefully executed and that this inspection service is ample in insuring a safe supply of this food.

Sanitary Food Inspection.

This service embraces the inspection of markets, meat markets, bakeries, ice-cream factories, confectioneries, free-lunch establishments, grocery stores, fruit stores, and restaurants. For facility of administration and in order to insure more frequent inspections two districts have been created, one embracing the north side of Main Street and the territory north, and the other the south side of Main Street and the section south.

The work in one district is assigned to the dairy inspector, and that in the other to the inspector of weights and measures. The activities carried out by this inspection service will now be considered in more detail.

Markets.—One small market house exists in which vegetables and fruits are sold; there is one small meat stand in it. The building is

of concrete, with cement floor properly trapped to the sewer, and is new and in excellent condition. It was inspected on a busy market day and found clean, well lighted, and satisfactory. A market master is on duty during the hours the market is open.

Meat markets.—Richmond resembles large cities to the extent that meat is not sold in one large general market, but in small meat markets located in different sections of the city. Most of these markets have cement floors, and all are fitted with proper screens in the windows and with screen doors during the summer months to exclude flies. These markets are inspected twice a month, but are not scored. A personal inspection was made of several, and they were found in good sanitary condition, although in some instances the hooks needed cleaning. On the whole, the meat markets may be considered as meeting sanitary requirements, and an adequate number of inspections are being made.

Bakeries.—These establishments are jointly under the supervision of the food inspectors of the State board of health and the inspectors of the local board of health, by authority conferred on the health officer by State regulations. Visits are made by the State inspectors twice a year, and the local service provides monthly inspection or at more frequent intervals if the necessity arises.

There is one large bakery which, in addition to local trade, does an extensive export business in cakes and crackers, two other bakeries of considerable capacity, and several smaller ones. There are no cellar or basement bakeries in Richmond, and all are either located on the first floor or in entire sections of a building.

An inspection was made of two of the large bakeries and of four smaller ones—6 out of a total of 10—and conditions were found satisfactory. The bakeries are well lighted and ventilated, screened against flies, and have satisfactory floors and walls. The clothes of the bakers were clean, most of them wearing bakers' suits.

A satisfactory protection of bakery products against contamination by dust and flies is carried out in bakeries, confectioneries, and grocery stores. Two-thirds of the bread produced by the three large bakeries is wrapped, and the bread, cakes, and pies offered for sale in the different establishments are kept in glass cases or screened compartments. All the show windows are inclosed in order to afford this protection.

Restaurants.—These establishments are inspected twice a month, and more often if reinspections are necessary to ascertain if required changes have been carried out. They are all screened against flies, and proper protection of cold meats and other food products against contamination by flies and dust is enforced. Attention is paid to the sanitary condition of the kitchen and preparation of food and

the cleanliness of tableware. An inspection was made of four restaurants, and general conditions were found satisfactory.

Ice-cream factories.—Two ice-cream factories were visited, and one was found in an excellent sanitary condition. In the other establishment the floor was dirty, the ice box was not clean and was in need of repair, and the general conditions were not up to the standard required in the manufacture of this article.

Grocery stores.—A few grocery stores were inspected, and these stores were in the main found satisfactory. Proper protection is given to food products attractive to flies.

Recently an inspection service has been instituted of places serving free lunches, and provisions for the proper protection of articles of food and the serving of lunches are being enforced. Attention is also being paid to cleanness of drinking glasses, plates, and other tableware used.

Sanitary Inspection.

The inspection work under this heading is performed by the same inspector engaged in placarding houses and performing terminal disinfection in cases of communicable diseases. The work is best considered under the following heads: (a) Inspection of garbage containers and care of garbage, (b) investigation of complaints and nuisances, (c) inspection of stables and manure boxes, and (d) privy vaults.

Inspection of garbage containers and care of garbage.—A city ordinance prescribes that the occupants of premises must provide and keep a water-tight receptacle of sufficient size to hold all the garbage produced on the premises, that the receptacle shall have a tightly fitting cover, and that all liquids must be drained off and only dry garbage placed in the container.

It is the duty of the sanitary inspector to visit premises at sufficiently frequent intervals to see that proper receptacles exist for taking care of the garbage, and that the provisions of the ordinance are being carried out.

Judging from an inspection of different sections of the city, it is believed that a satisfactory inspection service is being maintained and that garbage is receiving due care. About 50 per cent of the houses are provided with regulation garbage cans and most of the others have metallic receptacles with covers. Only a small percentage of cans were found without covers. Some difficulty has been experienced in securing proper drainage of liquids from the garbage, but a steady improvement is taking place, and on the whole the care of garbage is satisfactory.

Investigation of complaints and nuisances.—Complaints are received by telephone and in writing; the majority, however, are re-

ceived in the former manner. They are referred to the sanitary inspector for investigation, and if a nuisance is found to exist the inspector serves a written notice on the responsible party to abate the insanitary conditions in a specified time. A reinspection is made at the end of that period, and if nothing has been done a writ is served for the person to appear in the police court for trial. In some instances a second notice is sent before summary proceedings are instituted. This work constitutes one of the most important duties of the inspector, and results are not easy to accomplish without persistent effort. This employee is a recent appointee and is not yet sufficiently versed in sanitary work to be able to grasp the details necessary for obtaining maximum results.

Stables and manure boxes.—An ordinance requires that every stable must be provided with a water-tight and fly-proof manure box, and that it must be properly closed except when in use for placing manure therein or removing the same therefrom.

Active measures have been taken recently to enforce the provisions of the ordinance, and many owners of stables have been required to construct new boxes. The result of this campaign has been a material improvement in the care of manure, and although the majority of the boxes are not fly proof there has been an appreciable diminution in the number of flies. In fact, competent observers report that these insects are fewer this year (1915) than in any preceding summer.

The stables in Richmond are not in as good a sanitary condition as they should be. Wood floors are universal and proper drainage does not exist on most premises. Only a relatively small proportion of the manure boxes are built of concrete or brick and none of the wooden boxes are lined with metal sheeting. At least 90 per cent of the manure boxes are constructed of wood, and no matter how carefully they are built they do not long remain fly proof, as the boards warp and cracks result sufficiently large for the entrance of flies. The stable owner in the majority of instances does not seem to have grasped the principles of fly-proof construction, and knot holes, loosely fitting corners, and imperfectly adjusted boards are only too common in boxes which they consider as meeting the requirements of the ordinance.

An active inspection service is maintained and a number of persons have been fined for not keeping their manure boxes closed, so that a material improvement has been effected, and if there is no "let-up" in the campaign there will be a much larger number of fly-proof boxes in another year.

Privy vaults.—Although privy vaults have no place in a progressive city, large or small, they abound in most sections of Richmond, and the landscape of many back yards is marred by the presence

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of a dilapidated, insanitary privy. Many houses of the better class, with satisfactory plumbing installation, still retain the old privy vault on the premises; others, although a sewer is accessible, are not connected with the system, and even new houses undergoing construction have the option of a privy vault and are not required to install plumbing and connect with the sewer when it is available. The only regulation governing the construction and maintenance of the privy vault is that it must be built of concrete and kept clean. No attention is paid to making it fly proof. In addition to the vaults many surface privies exist. This condition of affairs, besides being a menace to the public health, is certainly not a credit to the city, and calls for prompt remedial action. An ordinance should be passed making it obligatory for all owners of houses to install the necessary plumbing and connect with the sewer when this is available, and to abolish all privy vaults and privies on said premises. When sewer connections can not be made and a privy is necessary as a temporary expedient, it should be constructed so as to be fly proof. The health officer states that he has already called attention to the necessity for such a regulation and the building inspector realizes the proper remedy; therefore, it is incumbent upon the city council to enact an ordinance that will meet this urgent demand.

The inspection of privy vaults is generally limited to an investigation as a result of a complaint and when they have become filled to overflowing and constitute a nuisance. A regular inspection of privies should be made, but can not be accomplished, because of the various activities now claiming the attention of the one inspector.

Vital Statistics.

A State law provides for the registration of births, deaths, communicable diseases, and marriages. It prescribes the duty of all health officers in relation thereto.

Ordinance requirements.—Briefly summarized as follows:

Physicians, midwives, and other persons are required to report on prescribed blank all deaths and births which occur under their supervision. Reports are required of all cases of communicable diseases listed as reportable in the rules of the State board of health.

Reports of deaths must be made immediately, proper death certificates filed, and a burial or removal permit secured before any disposition is made of the body.

Deaths occurring outside of cities and towns may be reported to the nearest health officer and said health officer is authorized to issue a burial permit, which is valid in all parts of the State. The death certificates in such cases are sent to the health officer of the county wherein the death occurred.

When no physician is in attendance the householder or other person having charge of the death reports the facts to the health officer, who executes the death certificate and issues the burial permit.

If the death is a coroner's case it is referred to that official who makes out the proper death certificate within three days after the request.

It is unlawful for any person to bury, cremate, or otherwise dispose of any human body until a permit has been received from the health officer. The burial of human bodies without a permit is illegal, and the responsible person is subject to a fine. Bodies so buried become coroner's cases, and the coroner of the county in which interment has taken place, shall disinter or otherwise secure the remains, hold an inquest, and report his findings to the health officer having jurisdiction. The cost of said inquest is charged against the person responsible for the illegal burial or other disposal of the body.

Buried bodies can not be disinterred and removed without a certificate from the State board of health. Application must be made on a prescribed form and regular permit secured. When reinterment is made in the same cemetery a permit is not necessary.

Births shall be reported by the physician, midwife, or other person in attendance or in charge of said birth. Records of all births, deaths, and reportable communicable diseases are kept by the health officer in record books prescribed by the State board of health.

All birth certificates and death certificates of the preceding month must be sent to the State board of health by the 4th of the ensuing month.

The foregoing abstract of the ordinance shows the requirements relative to the collection of vital statistics, and little need be added in considering this subject. The health officer copies in the prescribed books the pertinent data given on the certificates. This constitutes the local record, and the certificates are sent to the State board of health for preservation and use in compiling the State record.

Garbage Collection and Disposal.

Attention has already been given to the requirements governing proper receptacles and proper drainage and care of garbage on the premises; therefore it only remains to state that city garbage collectors are instructed not to receive or haul any wet garbage or any garbage from grocery stores, slaughterhouses, markets, stores, fruit or vegetable establishments, railroad cars, factories, or similar establishments. Wet garbage and that from the places specified must be removed by the owners or persons in charge of these establishments.

Collection.—The garbage from hotels and large restaurants is collected daily by private scavengers, who pay a small sum for this refuse. There is also a daily collection from slaughterhouses and meat markets; twice a week from stores, commission houses, and similar establishments; and a general collection from other houses by the city twice a week in winter and three times a week in summer.

The city has been divided into five districts, with one wagon in each. Each garbage collector is held responsible for the work in his district, and inspections are made to see that garbage is being satisfactorily collected. Garbage cans are not allowed in the alleys, but householders are required to place the receptacles on the back of their lots, so as to be easy of access to the collector.

Equipment.—The equipment consists of four double-team wagons and one single-team wagon. The city owns the boxes and hires the team and wagon, with the driver, at \$3.50 a day for double teams and \$3 for the single team.

The driver of the wagon is the collector and loads his wagon, but assistance is given in unloading at the incinerator. Each driver is assigned to a specific district, so that he becomes familiar with all parts of his territory, and a more efficient collection of garbage is insured.

The wagon boxes are of wood and have a capacity of $1\frac{3}{4}$ yards. They are obsolete in type and not satisfactory, as they can not be dumped, and the garbage has to be shoveled from them in unloading. Furthermore, the boxes are too small, as two horses can haul a larger load than the amount of garbage contained.

Disposal.—A newly constructed garbage incinerator has been located at a central point on the bank of the Whitewater River, so that the haul is short, and only a small number of wagons are necessary for a satisfactory service. The incinerator has a capacity of 7 tons a day and is sufficiently large to burn satisfactorily all the garbage of the city. Two inspections were made, and the method of handling garbage at the plant was studied. The building was clean and no offensive odors existed. The incinerators were satisfactorily operated, and no criticism could be made of the general sanitary condition of the plant.

The amount of garbage disposed of in the incinerator during 1914 was 6,275 cubic yards. There were also 531 dead animals burned at the plant.

The total cost for collection and disposal of garbage for the year was \$7,196.22. The collection of garbage is sufficiently frequent to meet requirements, and the method of disposal is the most satisfactory for a small city. Economy would be ultimately effected, however, by improvement in equipment and the substitution of dump wagons for those now in use.

The question of care, collection, and disposal of garbage is receiving due attention, and the service maintained is a credit to the city and the health department.

Rubbish and Ashes.

Although rubbish and ashes are collected by the division of streets in the bureau of public works, it is deemed best to consider this activity in this order:

Ordinance requirements.—Occupants of premises are required to provide proper receptacles for all combustible trash, which must be placed near a street or alley accessible to the rubbish gatherers, and all material of this variety that accumulates on the premises must be placed in this receptacle. No noncombustible

tible material may be placed in this receptacle. Ashes, dirt, cinders, bottles, broken glass and crockery, and other noncombustible rubbish must be deposited either in suitable receptacles or in piles in the alleys so as to be easy of access to the city gatherers. When the rubbish is not deposited as prescribed herein it shall be removed at the expense of the owner or occupant of the premises upon which it has accumulated.

A weekly collection of ashes and other rubbish is made, but from hotels the ashes are removed three times a week, one collection being made by the city and the other collections at the expense of the hotels. The city does not collect ashes from manufacturing establishments, and this removal is effected by private parties at the expense of the factory. During the summer an extra wagon is in service for the collection of papers, boxes, and other rubbish of this variety.

An inspection of the dumps found them in good condition. Ashes and other rubbish are removed to dumps and utilized for filling low areas. The city owns the boxes, but hires the wagons, teams, and drivers. Ten 1-horse wagons, at \$3 a day, are employed in this service, and an inspection of the alleys shows that a satisfactory collection is carried out. During the summer the loading is done entirely by the driver of the wagon, but in the winter a helper is provided for every two wagons. The wagons are small and the boxes average about $1\frac{1}{2}$ yards.

During 1914 there were removed 11,726 loads of rubbish at a cost of \$0.825 each, and the total expenditure for this service was \$9,645.55.

An inspection embracing all sections of the city showed that practically every household had provided a receptacle for containing combustible waste and that the yards were kept free from this rubbish.

The collection service is sufficiently frequent for the needs of the community and on the whole is satisfactory.

Tuberculosis Survey.

As the determination of the tuberculosis incidence was the prime reason for asking for a study of sanitary conditions and the morbidity rate of preventable diseases, this phase of the investigation was the first to receive attention.

It was ascertained upon inquiry that cases of tuberculosis were not reported to the health department and no information as to the morbidity rate of this disease was obtainable. Well-informed persons stated that the number of deaths from tuberculosis was greater in Richmond than in most other cities of the same size in the central area of the State, but were unable to advance any explanation and could not understand why the tuberculosis rate should be high in such a clean and well-built city.

Richmond is a city of detached houses, with the exception of a small business section and a few blocks in the old part of the town. There is ample space between the buildings for the free circulation of air and for the beneficial influence of sunshine. The vast majority of the homes have neatly kept lawns, and yards or gardens on the rear of the lot. The general appearance of the city is pleasing and attractive, and the impression created is that the city is well built, well kept, and essentially a residential one of wealth.

Realizing that the poor of a community furnish the greater number of cases of tuberculosis and that unsatisfactory housing conditions are potent factors, and, furthermore, that no city, however progressive, has yet reached the stage where no poverty exists, a general survey of the city was made to determine the extent of these conditions. Their consideration will be deferred until later.

Study of mortality statistics.—There is a satisfactory State law governing the collection of mortality statistics, which requires the report of all deaths occurring in a community to the health officer having jurisdiction. A properly executed death certificate is a prerequisite for securing a burial permit, and any body interred without such a permit having been obtained becomes a coroner's case, can be disinterred, and the cost incident thereto charged against the responsible party. It is believed that the law is complied with in Richmond and that deaths are properly reported.

The question naturally arises, Is the cause of death correctly stated, especially in persons who have died without a physician in attendance? There would seem to be less chance for error in deaths from tuberculosis than in those due to acute affections, as the former is essentially a chronic disease and has at some time come under the attention of a physician, and even in the absence of such the family is cognizant of the nature of the disease causing death in the majority of such cases.

Consideration was given to the possibility of error in charging as deaths from tuberculosis those resulting from terminal pneumonia in sufferers from chronic bronchitis and those from pneumonia as a sequelæ of grippe.

The ratio of deaths from tuberculosis per 1,000 inhabitants was compared with the ratio for the registration area for the same period. The rate of the former was lower than the latter. A similar study was made of the deaths from pneumonia in order to determine if an abnormally high death rate from this disease would indicate that deaths from tuberculosis had been charged against pneumonia. Comparison with the rate for the registration area showed that the ratio in Richmond was slightly lower; therefore it is fair to assume that the mortality statistics of tuberculosis are sufficiently accurate for practical use in determining any undue prevalence of that disease.

Tabulation of deaths by streets and districts.—In order to establish a basis for an actual survey in determining the number of cases of tuberculosis, a transcript from the records was made of all deaths from tuberculosis that had occurred during 1912, 1913, and 1914. The following data were tabulated: Name, age, sex, address, and seat of tuberculosis of the decedent. A further arrangement by streets was also made for facility of reference.

The object sought by this tabulation and study was to determine whether the majority of deaths occurred in specific areas or was equally distributed throughout the city, the natural assumption being that if there was a grouping of deaths in certain sections the same districts would correspondingly yield the majority of the cases of tuberculosis. Such premises are correct for a city like Richmond, with practically no floating population. In fact, there is little change of residence from one section to another, as a large percentage of the people own their homes, and even those of the tenant class as a rule change only from one block or street to another in the same locality. The study of this tabulation gave valuable and interesting information and showed that 70.7 per cent of the total number of deaths for the three years specified had occurred in the sections of the city designated as 1 and 2.

Deaths from tuberculosis, 1912 to 1914, inclusive.

1912	32
1913	35
1914	32
Total	99
Distributed as follows:	
Section 1:	
South First to South Twelfth, inclusive	35
North Second to North Seventh—Main Street to Seventh Street, inclusive	13
	48
Section 2:	
North of railroad (Riverdale)	22
Total for sections 1 and 2	70
Section 3:	
North Eighth to North Twenty-second Street, inclusive	12
South Thirteenth to Twenty-third Street, inclusive	6
Main Street, East of Twelfth Street	2
West of River	9
Total	99
Percentage of deaths occurring in sections 1 and 2	70.7

Deaths from tuberculosis, 1914.

Section 1:	
South First to South Twelfth, inclusive	11
North Second to North Seventh—Main to Seventh, inclusive	3
	14
Section 2:	
North of railroad (Riverdale)	8
Section 3:	
North Eighth to Twenty-second, inclusive	6
South Thirteenth to South Twenty-third, inclusive	1
West of River	3
Total	32
Percentage of deaths occurring in sections 1 and 2	68.75

It was deemed advisable to use an annual average of the number of deaths occurring during a period of three years as a basis for determining a case-to-death ratio instead of those for one year only, as the results would be more reliable and there would be less chance for error on account of several deaths in advanced cases falling within one year. Furthermore, it was decided that deaths occurring in the last three years would be more indicative of the amount of tuberculosis actually existing at the time of the survey than an average deduced from a longer period. In order to obtain a check on the result obtained by the tabulation, a study was made in the same manner of the deaths that occurred from tuberculosis during the preceding three years (1909, 1910, and 1911) and while the percentage of deaths (66.36) that had occurred in sections 1 and 2 was slightly lower, the fact that the majority of deaths from tuberculosis took place in the two districts specified was still further proved.

Determination of ratio of cases to deaths.—The fact having been established that at least 70 per cent of all deaths from tuberculosis occurred in two sections of the city, it was fair to assume that these districts furnished the majority of the cases, and it was decided to make an intensive study of those sections in order to determine the number of cases of tuberculosis existing therein and thereby establish a case ratio to deaths. It is correct to assume that if a reliable ratio could be established for 70 per cent of the deaths, the number of cases represented by 30 per cent of deaths in the third section of the city could be easily computed. This ratio and the data obtained relative to the total number of cases of tuberculosis would be sufficiently accurate for all practical purposes, and would show the tuberculosis incidence in the city.

Physicians requested to report cases.—A circular letter was sent to every physician in the city requesting name, address, and age of patient, and seat of disease in cases of tuberculosis under their care

during the preceding year and of which they had knowledge. Hope was entertained that data concerning a considerable number of cases would be obtained and that this would form a basis on which a house canvass could be more easily carried out. Twenty out of 48 physicians replied, but the number of cases each reported was relatively small. The poor results obtained were no doubt due to the following: (a) The fact that many of the physicians did not keep records of the patients consulting them and could not recall all cases of tuberculosis that had come under their care, and (b) the hesitancy of some physicians to furnish data concerning their patients to investigators. While the number of cases reported was small, they were of value in their bearing on deductions drawn from the study of the mortality statistics and showed that the majority of them existed in sections 1 and 2 of the city.

House canvass.—It was deemed advisable to make an intensive study by means of a house-to-house canvass in order to secure as accurate data as possible concerning the number of tuberculosis sufferers present and the determination of an accurate ratio of cases to deaths. It was thought feasible on account of the size of the city and from the fact that most of the inhabitants have resided more or less constantly in one section, if not on the same street and in the same block. Such a survey would be a herculean task in a large city or in one with a large floating population, and would not yield satisfactory results. It was thought that the important factors of housing, general sanitary conditions, and the approximate financial status and mode of living could be ascertained and whether any of the above had been a predisposal causative agent in specific cases of tuberculosis determined.

Unless one has done a house canvass he can not fully appreciate the tact, diplomacy, and perseverance necessary to be exercised in gaining information concerning cases of tuberculosis. The sufferers themselves are averse to admitting that they are afflicted with the disease, and in many instances do not realize the gravity of their condition. Information concerning cases of tuberculosis most frequently has to be obtained from other residents in the immediate locality, and is often elicited only after a rather prolonged conversation on various topics. Much depends upon the manner in which the questions are put and preliminary inquiry relative to whether there are any persons in the neighborhood who are suffering from chronic colds, chronic bronchitis, prolonged grippe, and those who had pneumonia during the past winter and have not fully recovered, remaining pale, with loss of weight and a slight cough. A stranger has to introduce himself, state why he is making a canvass, and gradually lead up to the information he seeks. This is not

always gained at the first house visited, but is elicited by interviewing the residents a few houses farther along the street. This is generally not because the person does not wish to give you the information, but because a case can not be recalled. The person is often busily engaged in work around the house, and her thoughts are on other matters than that in which the investigator is interested. However, by perseverance one will eventually find some one who knows practically all the residents in the block and will freely give information. In many instances it has been necessary to visit nearly every house in the locality, but in others the canvass has been successfully made by visiting only 25 per cent of the houses in the block. In many instances cases were found in houses directly visited, but in more than 50 per cent of the cases the primary information was obtained as outlined above. Of course, the canvass was made easier by the fact that the people had been long resident in a specific locality, and therefore always knew their neighbors and generally most families in the block. In this connection the uniform courtesy of persons interviewed can not be too highly extolled. They were always agreeable and pleasant, which made the task much less irksome, and yielded results which could not have been accomplished with a less courteous reception.

The number of deaths from tuberculosis during the past three years was utilized as a factor in making the survey, and the houses in which they had occurred were visited in order to ascertain if cases of the disease existed in other members of the family or in any new tenants. In the event the persons had moved to another locality, a visit was made for the purpose mentioned. The fact that a certain-named person had died from tuberculosis at a given address was always mentioned in order to recall the fact that the disease had existed in the neighborhood and that there might be other cases about which information could be given. Likewise, the known cases were also used as a pivot in the same manner for eliciting information about others that might be present in the immediate vicinity. The utilization of these facts refreshes the memory of the person being interviewed and often results in other cases being recalled.

The next step was to visit the suspected tuberculous sufferers about whom information had been received, and here even more tact was required in obtaining a clinical history that would determine whether the case was one of tuberculosis. Physical examinations were out of the question in most instances and one's diagnosis had to be based on general physical signs and history, supplemented by previous information obtained from an unbiased source. By such imperfect methods, the best that could be employed under the circumstances, an element of error exists, but the percentage is in favor of mild,

incipient cases having escaped detection rather than that sufferers considered tuberculous were afflicted with some other disease.

Hope had been entertained that one of the nurses of the Domestic Science Club could be secured to assist in the work, but while the survey was in progress an increase in her duties rendered such assistance impossible.

Riverdale—Section 2.—This was the first district to receive attention because, in the first place, it contains in proportion to population the highest percentage of poverty, and secondly, a relatively larger number of unsatisfactory houses. A portion constitutes the slums of Richmond, and general unsatisfactory sanitary conditions exist in certain areas. Furthermore, more than one-half of the entire negro population of the city reside there.

A thorough canvass was made, during which every house was visited in the poorest district and an intensive study made of the entire section. An actual count of families and houses was made in order to determine as accurately as possible the number of inhabitants in this section. As it was found that 11.68 per cent of the houses were vacant, it was evident that the population had decreased as a result of the closing down, about 18 months ago, of a large manufacturing establishment. Taking this into consideration, it was deemed better to take the average annual number of deaths for two years instead of three as a basis for determining the amount of tuberculosis on a case-to-death ratio. Two deaths that are given in the general number as having occurred north of the railroad were eliminated, as they occurred in an outlying district not covered by the canvass; therefore, the number of deaths considered as a yearly average was 6.

The canvass showed 45 cases of tuberculosis, and as it is fair to add 10 per cent for cases not found, the number, 49.5, is considered as approximately accurate. This gives a ratio of 8.25 cases to each death registered.

Section 1.—It was deemed advisable to subdivide section 1 into (a) the portion north of Main Street, including North Second Street to North Seventh Street and that part of Main Street embraced between these points; (b) the district south of Main Street, extending from South First Street to South Twelfth Street, inclusive.

A canvass of the district designated "a" gave a ratio of 6 cases per death and that of "b" yielded a case ratio of 6.6. These indices are based upon the cases found and the addition of 10 per cent as a conservative estimate of tuberculosis sufferers that were not detected. The average number of deaths occurring from tuberculosis in this section for three years was used in computing the ratio.

Ratio of cases to deaths.—In determining the ratio of cases to deaths it has been deemed advisable to take an average of the rates

determined in the three districts canvassed. This gives a ratio of 6.95 cases of tuberculosis to each death from that disease. By this method a larger number of deaths and cases are available for computation, and it is thought that a more reliable ratio has been secured. The acceptance of the highest rate, that of 8.25 for Riverdale, does not seem proper, as that section embraces the slums of the city and forms a comparatively small part of the total area. Neither does it seem fair to accept the lowest rate, as the district covered by the canvass is small and erroneous deductions might result. However, it is believed that the determined ratio of 6.95 is approximately correct.

Tuberculosis incidence.—In this determination an average of the number of deaths from tuberculosis for the past three years has been taken, as it is believed that such a number will yield more accurate results than that for a single year. During the period mentioned there were 99 deaths, giving an annual average of 33, and by use of the determined ratio, 6.95, the multiplication gives 229 recognizable cases of tuberculosis of all varieties as the number existing in the city. While no claim is made that the number given is absolute, it is considered as accurate as it is possible to secure.

If the highest ratio (8.25) determined is used in computing the number of existing cases, there would be 272 cases, a number believed to be excessive for a city of 24,529 inhabitants and of such a type as Richmond.

The ratio determined is practically the same as that given (1:7) by most authorities, and is believed to constitute a reliable index for small cities of the better class in which there is no floating population and where there are practically no migrant tuberculous sufferers. However, in New York City during 1913, where satisfactory notification of the disease is practiced, there were only 6.2 reported cases for every death registered. Hoffman and some other authorities estimate the number of existing cases as 10 to 1 death; this would give 330 cases, a number certainly too high for Richmond.

Ratio of cases to population.—As the deaths from tuberculosis had been tabulated according to streets and districts, and a case-to-death ratio determined in the same manner, it was only necessary to ascertain the population in the respective sections in order to give a ratio of cases to number of inhabitants. The data have been deemed of sufficient interest to embody and will be presented according to districts and as a total.

The population of the city is estimated as 24,529, which is believed to be approximately correct. It is fair to state, however, that this estimate is about 500 more than that of the State board of health and 500 less than the estimate given by citizens conversant with local conditions. The result was secured by using the population of the 1910 census as a basis and adding the number obtained by computing

the rate of increase, based on that which had occurred during the preceding 10-year period.

As most of the districts created for survey purposes correspond to ward boundaries, the same procedure as that used for computing the population of the city was employed in obtaining the estimated population of the different sections. Furthermore, as a general election was held in November, 1914, and a large vote polled, the figures obtained on the basis of population to voters were also utilized. The figures obtained by the two methods differed very little, and, therefore, it is fair to assume that the estimated population for the different districts is approximately correct. These interesting data are presented as follows:

City.—The total number of cases of tuberculosis is given as 229 and the population at 24,529; therefore the case ratio for the entire city is 1 to 107 inhabitants.

Riverdale—Section 2.—This section has a population of 2,800, and on the basis of the ratio 6.95 cases for each death the high rate of 1 to 54.91 inhabitants results. If the ratio (8.25) determined by actual canvass is used in the computation, and a population of 2,650 embraced in the district surveyed is accepted, the ratio is 1 to 53.53.

Section 1—(Subdivision A).—This district embraces North Second to North Seventh Street, inclusive, and Main Street to the latter point. It has a population of 1,957, which, on the case ratio of 6.95, gives the rate to population of 1 to 65. If the computation is made on the ratio (6) determined by canvass, the result is 1 to 75.

Section 1—(Subdivision B).—This extends from South First to South Twelfth Street and includes the south side of Main Street to the latter point. The estimated population is 7,440, and a ratio of 1 to 91.85 is obtained by using the rate 6.95 as a basis. However, if the ratio (6.6) determined by canvass is used, the result is one case to 96.62 inhabitants.

Section 1—(Subdivisions A and B combined).—As the general housing and sanitary conditions are practically the same in the greater part of this section, the two subdivisions have been combined in order to obtain a ratio that will be more representative of this section as a whole, and as a greater number of cases and a larger population will be factors in the computation, a more reliable index should be obtained. The population is 9,397, and the result obtained by use of the ratio 6.95 gives one case to 84.5 inhabitants. If that determined by canvass is employed, the ratio is 1 to 91.2.

Section 3—(Subdivision A).—This district embraces that part of the city from North Eighth to North Twenty-second Streets and the north side of Main Street between these points. The population is 4,952, which, on the ratio of 6.95, gives one case to 164 inhabitants.

Section 3—(Subdivision B).—This includes the area embraced by South Thirteenth and South Twenty-third Streets and also the south side of Main Street between the points specified. It has a population of 2,805 and gives a case ratio of 1 to 174.

West Richmond.—Included under this division is the entire section of the city west of Whitewater River. It has a population of 4,575 and gives the very satisfactory case ratio of 1 to 219 inhabitants.

Recapitulation.—The following table presents in concise form the ratio of cases of tuberculosis to number of inhabitants in different sections of the city.

TABLE 1.

Section.	Average annual number of deaths registered.	Ratio of cases to deaths.	Population.	Ratio of cases to inhabitants.
No. 2 (Riverdale).....	7.33	6.95	2,800	1-54.91
No. 1.....	16	6.95	9,397	1-84.5
No. 3 (subdivision A).....	4.33	6.95	4,952	1-164
No. 3 (subdivision B).....	2.33	6.95	2,805	1-174
West Richmond.....	3	6.95	4,575	1-219
Entire city.....	33	6.95	24,529	1-107

A study of the statistical data presented shows that the case ratio is high in Riverdale and also in Section 1, and that 70 per cent of the cases of tuberculosis occur in these two sections, which contain a little less than one-half of the total population.

Riverdale contains proportionally the largest number of unsatisfactory houses and the highest percentage of poverty. In that area extending from Eleventh to Nineteenth Street and between North F and North J Streets, many of the houses are old and dilapidated, insufficiently lighted and ventilated, and unfit for human habitation. The cellars are not cemented, consisting of a hole beneath the house or a portion thereof with imperfectly constructed walls and an earth bottom. They are in many instances wet and often contain standing water, are not ventilated and do not meet the sanitary requirements necessary to insure satisfactory housing conditions. In other instances the houses are placed on the level of the ground, so that there is no circulation of air beneath the floor, with resultant dampness during the greater portion of the year. The only redeeming feature of these houses is that they are detached and are loosely built frame structures, so that notwithstanding their insufficient window area for light and ventilation, the latter is augmented by entrance of air through cracks and crevices.

Section 1 is the oldest part of the city and contains a considerable number of houses that were constructed years ago, when the necessity for an abundance of light and a bounteous supply of fresh air was not as clearly understood as to-day. In many instances housing con-

ditions are not satisfactory, and this is especially true in the western part of this district. The majority of the old houses are built of brick, with insufficient window area, and have cellars with earth bottoms of the type already described. Furthermore, this section contains the second highest percentage of the less financially able and practically the rest of the negro population of the city. The different streets in this section vary materially not only in character of housing conditions, but also in the amount of tuberculosis present, and while some areas compare favorably with those in section three, on the whole general conditions are not as satisfactory as in the more recently constructed portions of the city.

While it would be manifestly erroneous and unfair to place this section in the same class as Riverdale, especially that portion of the latter specifically described, nevertheless the same operative factors are present to a less degree, and it is fair to conclude that unsatisfactory housing conditions and limited financial resources, that pertain to a larger percentage of the people in these two sections, are important factors in causing the larger number of cases of tuberculosis in these districts.

Section three is newer, constitutes the residential section of the more financially able, and contains larger and more pretentious houses, with more extensive yards and gardens. There are some old houses of an unsatisfactory type, which are more numerous in subdivision A, but on the whole housing conditions are satisfactory. Many of the houses have been recently built, sleeping porches are not uncommon, and the value of sunshine and fresh air is more fully appreciated by the residents of this district. One would naturally not expect to find a high incidence of tuberculosis in such a residential section, and the statistical study shows a relatively small number of cases of this disease.

West Richmond, the section west of the river, is the newest part of the city and the least closely built. Most of the houses are of recent construction and more fully meet modern sanitary requirements. The amount of tuberculosis per capita is the lowest in the city.

Status of Richmond from a tuberculosis standpoint.—In order to determine whether the reputation that Richmond suffers unduly from tuberculosis is founded on fact or is simply an impression that has been passed on, it becomes necessary to make a comparative study of the tuberculosis incidence of the city with that of other sections and other cities of the same size in the State.

Comparative studies.—As the registered tuberculosis death rate as a rule bears a definite relation to the general death rate, a comparison of this will be made with that in the registration area. The ratio for Richmond is as follows: In 1912, 1 registered death from tuber-

culosis to 9.47 from all causes; in 1913, 1 to 7.71; in 1914, 1 to 9.71, giving an average of 1 to 8.96. The average ratio for the registration area for a period of four years, 1909 to 1912, inclusive, was 1 to 9.1.

From the above it will be seen that the average ratio is practically the same as that for the registration area, and if that for 1913, which is abnormally high, is excluded, the percentage is slightly in favor of this city.

A further comparison will be made with the registration area by computing the death rate from tuberculosis per 1,000 inhabitants, and as the determined ratio will be used for comparison with the rate for the State and other cities in Indiana, the estimated population given by the State board of health will be used.

The rate for Richmond is as follows: 1912, 1.407; 1913, 1.512; and that for 1914, 1.335 per thousand inhabitants. As shown by the computation already given, the rate for 1913 is high, and an average rate for the three years will no doubt furnish a more accurate index of existing conditions in this particular; this rate is 1.418. The rate for the State of Indiana for the same period is: 1912, 1.482; 1913, 1.484; 1914, 1.458; and that of the registration area for the years 1912 and 1913 is 1.495 and 1.476, respectively. The rates for Wayne County, in which Richmond is situated, are: 1912, 1.289; 1913, 1.498; 1914, 1.218.

By comparing not only the ratio of deaths from tuberculosis to total number of deaths, but also the rate of deaths from this disease in 1,000 inhabitants, it will be seen that Richmond does not make a very bad showing, as the rate per thousand is lower than that of both the State and the registration area. The rate is higher than that for the county, and it is correct in principle to expect this, as tuberculosis is not as prevalent in villages and rural communities as in cities.

A comparison made with eight cities in Indiana with populations ranging from 20,000 to 30,000, shows the rate for Richmond higher than in four and lower than in the same number; therefore the prevalence of tuberculosis does not seem to differ materially from the incidence of this disease in similar cities in the same geographic location.

Economic status of families having tuberculous sufferers.—In order to determine what percentage of families in which some member was suffering from tuberculosis was a direct charge on the community by receiving charity from public or private sources, an examination of the records of the central bureau of charities was made. This was attempted only for the two sections surveyed, as there were no data available for the other parts of the city.

A comparison was made with the record of determined cases, with the following results: In Riverdale (section 2) 28.88 per cent of such

families were the recipients of charity, and the majority of them had been receiving such aid over a period of several years. In one family four members who had died from tuberculosis had been buried at the expense of the county. In section 1 a more satisfactory showing was obtained, as only 4.16 per cent of families with tuberculous sufferers had received such aid.

In this connection it might be pointed out that the cost of charity forms only a small fractional part of loss to the community resulting from a case of tuberculosis. When the cost of nursing and of medical attention is considered and the loss of earnings, especially if the person is in young adult life, is computed, a conservative estimate will show a loss of \$2,500 to \$3,000 for each case of tuberculosis.

Housing conditions.—Attention was given this subject, to a certain extent, when the case ratio of tuberculosis to number of inhabitants was considered for the different districts, and little need be added. It was pointed out that Riverdale contained a considerable proportion of badly constructed and unhygienic houses, and that housing conditions in a large area of this section were not satisfactory. Section 1 furnishes about one-half of the cases of tuberculosis occurring in the city, and the question of housing conditions naturally arises. It has already been stated that the majority of the houses in this district are satisfactory, but there exist, especially in the oldest part, a considerable number that do not meet modern requirements and that could be materially improved for the betterment of the public health. Conditions are satisfactory in the other sections, with few exceptions. Housing conditions, without doubt, play a part in causing the high tuberculosis rate in Riverdale and certain areas of section 1. With these exceptions, housing conditions generally in Richmond are satisfactory and are not potent factors in causing an undue prevalence of tuberculosis.

Infection of house environment.—In the light of our present knowledge the "open" consumptive is most dangerous to his immediate family and other persons living in the same house with him. Tuberculosis is contracted through intimate and prolonged association with some individual suffering from the disease, and does not result from a single exposure, as in the case of some other communicable diseases. The sufferer from pulmonary tuberculosis readily infects his environment unless the most scrupulous care is exercised in the disposal of his sputum and proper precautions are taken during the attacks of forceful coughing. Lack of sunshine and inadequate ventilation increases the liability of infection, and soiled blankets and bed linen are believed to be potent factors in this respect.

When consideration is given to the fact that the infective agent of this disease lurks behind the intrenchment of darkness, bad housing

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conditions, and poverty, it will be readily seen that the members of the family—especially the young—of a promiscuously spitting consumptive, living under such environment, generally in the same room and often sleeping in the same bed with the afflicted person, have little chance to escape infection. That this is fact and not theory is known to all observers, and while the instances cited herein add nothing new to our knowledge, still they so forcibly illustrate the danger pointed out that it is not amiss to make some mention of them:

1. *Family H* furnishes the following history: Mrs. H., age 47, mother of 12 children, 8 of whom are dead, 4 having died of tuberculosis, 1 in childhood, and 3 in young adult life. To this number of deaths must be added the death of the husband (Mr. H.) from the same disease and the infection of one of the remaining children with tuberculosis, making a total of six cases of the disease in the family. The primary case in the family can not be definitely determined, but it is thought to have been that of Mr. H., who died in 1912. Another daughter, age 24, and a son 16 years old became infected and died in 1915. A third daughter is now suffering from the disease in the incipient stage. The mother is strong, robust, and apparently perfectly well, although she has been in intimate contact with all four cases, nursing and caring for them during the bedridden stage, and has lived in a badly infected environment for years. The family is very poor and has been the recipient of charity for a number of years. The two houses occupied during the time the cases of tuberculosis cited were present are poorly constructed shacks, badly lighted and ventilated, so that the sick and well alike were crowded into inadequate quarters in an environment that in every particular fostered the spread of the infection.

2. *Family B*.—A brother developed consumption; a year later another member of the household contracted the disease, and both died in 1914. A niece 16 years old living with the family is now suffering with incipient pulmonary tuberculosis. Housing conditions very bad. House small, dark, damp from defective cellar, and poorly ventilated. Every essential present for a badly infected environment.

3. *Family Bi*.—A son developed tuberculosis and died; the mother, who from household duties and care of the invalid was in intimate and constant association with the case, contracted the disease and died in 1914. Another son is now suffering with tuberculosis in the advanced stage, being nursed by a sister. The chain of infection is not difficult to trace and the story, unfortunately, is only too common.

4. *Family R*.—The mother has been a sufferer for years from chronic pulmonary tuberculosis. A daughter aged 17 died from tuberculosis in 1913, and Mr. R., the father, is now a victim of tuberculosis in the advanced stage. The house in which they have lived for a number of years is in a wretched condition, dark, damp, and dirty, with inadequate ventilation. The quarters are small; therefore with a family of seven there must be close and constant contact between the well and the sick. The three younger children are frail, and the youngest, 7 years old, has not the physical development of a normal child of three.

5. *Family D*.—The setting for this picture is a house in which a death from tuberculosis occurred in the family of the previous tenant. Immediately after the funeral they moved to other quarters, and the house, without a thorough cleaning, was rented to another family, who occupied it a few days later. After

an interval of a few months an incipient case of pulmonary tuberculosis developed in a child of the family that had previously been free from the disease.

6. *Family K.*—The story of this family follows the usual trend; two sons lost in the prime of manhood; later two young and attractive daughters die within a week of each other from tuberculosis, and another son, married and with a family, in the incipient stage of the disease—four gone, another diseased, out of a total of seven. In this instance the housing conditions are satisfactory, and the distressing results must be attributed to ignorance of the essential measures to be employed in preventing the infection of the home environment.

7. *Family C.*—A son died in 1910 from tuberculosis. A married daughter living at home contracted the disease and died in 1913; a second daughter is now in the advanced stage of the disease. To the above must be added another son, who is also a victim and has transmitted the disease to his wife.

8. *Family S.*—This family has lived in one of the older types of houses for 13 years, and, judging from the limited quarters, must have been overcrowded. The house is dark and insufficiently ventilated, having a window area entirely inadequate for satisfactory housing conditions. The history is briefly as follows: A daughter died from tuberculosis in 1910; a son succumbed to the same disease in 1912; a second daughter died from the malady in 1914; a third daughter has the disease, evidently contracted at home, and has lost her son, aged 10, from the same infection; and another son is a victim of the disease in the advanced stage. The father probably also has the disease. Therefore, out of a total of eight members of this family only two have so far escaped—the mother and the eldest son, who has not resided at home for a number of years. It is believed a different picture could have been drawn if the remedial measures which we know to be effective in combating tuberculosis had been available and the community through such an organization could have extended a helping hand to pluck the victims from the flood that engulfed them.

Other examples could be cited, but it is believed enough has been said to show the great danger of infected home environment and to prove that the well generally contract tuberculosis through intimate contact with individuals suffering from the disease.

Second to intimate contact in homes where a careless consumptive resides, the places in which the public gather, as theaters, moving-picture halls, factories and schools, afford the best opportunities for infection. Street cars and railway coaches must also be placed in this category, although the danger exists to a lesser degree.

Deductions.—It is believed that a consideration of the foregoing permits the following deductions: Although Richmond does not merit the reputation it has gained as a center of unusually high tuberculosis incidence, this disease is sufficiently prevalent to become a matter of concern to its citizens and remedial measures are necessary. When it is realized that the great majority of tuberculosis victims are of an age when they would be most productive to the community, the economic phase of their loss should receive careful attention. The question has been asked, What will be accomplished? Will any action be taken toward instituting remedial measures? It should be possible to answer in the affirmative, because, first, the

community is abundantly able to finance the necessary measures, and, secondly, the county and city officials are too intelligent and the citizens generally too public spirited to allow their city and county to lag behind in the campaign now being universally waged in combating this disease. Other counties in the State are taking action and the campaign is being successfully conducted in neighboring States; therefore Wayne County should be found in line and its progressiveness in the interest of its tuberculosis sufferers demonstrated.

Antituberculosis Society.

An organization known as the Wayne County Antituberculosis Society for the prevention of tuberculosis was formed in 1906. It is affiliated with the State antituberculosis society, and has been engaged in an educational program by means of lectures, exhibits, and circulars setting forth in popular style pertinent facts relative to tuberculosis. Statistical data of the society show that the tuberculosis situation of Wayne County has improved during the past 10 years, and a study of mortality statistics of Richmond demonstrates the fact that the tuberculosis death rate is not as high as it was several years ago.

Since the enactment of a law in 1913 empowering county commissioners to build hospitals for the care and treatment of tuberculous sufferers, the society has been active in pointing out the need for such a sanatorium, and has progressed to the point of preparing plans of a suitable tuberculosis hospital, which have been presented to the county commissioners for consideration.

Remedial Measures.

General.—In any campaign waged against tuberculosis certain important factors must receive earnest consideration. In the first place, attention must be directed toward relieving poverty, the regulation of housing conditions, improvement of general sanitary conditions, the decrease through carefully executed regulations of the morbidity from other diseases, the control of the hours and conditions of labor, and the insuring of a safe milk supply. In fact it may be stated that these take precedence over the erection of hospitals as a preventive measure.

If permanent and satisfactory results are to be accomplished, all operative factors must receive consideration, and full achievements must not be expected from the utilization of only one weapon in the warfare against this disease. This must not be interpreted to mean that institutional treatment of tuberculosis is not of the greatest importance in decreasing the morbidity and mortality from this

disease, but that it is only one of many measures to be adopted to this end.

Migration of tuberculosis sufferers.—As the obligation of the community to its tuberculous inhabitants will be considered later, and the fact that many victims of this disease are still advised to seek climatic cure without a clear understanding of the difficulties and disappointments that may be met, it has been deemed advisable to mention some facts pertaining to the migrant.

The victim of tuberculosis in the majority of cases has a desire to leave the place in which the disease was contracted. He feels that if he can go to one of the Western States famed as a resort for such sufferers he will soon regain his health. He does not realize that more than a few months are necessary to cure consumption, and that he should have sufficient funds to provide him for at least six months or a year with such comforts as he has been accustomed to receive at home.

The two important factors in the cure of a specific case are the intelligence of the individual and his financial status. If he has the means to purchase the four essential commodities—rest, food, open air, and medical attention—let him migrate and receive the added benefits of climate.

Before advising a tuberculous sufferer to seek a change, however, the fact that climate alone does not cure must be borne in mind. Inquiry should be made to determine whether the person has sufficient funds to provide the essentials for the arrest or cure of his disease, not overlooking the fact that in no disease is competent medical attention more necessary, and if such funds are not possessed, the sufferer should be advised against attempting the trip. What has been said applies to all cases of tuberculosis and can not be too forcibly emphasized in advanced cases of the disease, as no possible benefit can accrue to such a victim by going to a western health resort.

The fact must not be overlooked that the essentials for the cure of tuberculosis are purchasable commodities in Richmond as well as elsewhere and by the application of these cardinal principles an arrest or cure can be effected in that climate. Therefore, if those of limited financial resources would apply the funds intended for a trip west to a treatment at home, certainly as much if not more benefit would be received, and the individual would remain in contact with his family and friends with the added satisfaction this gives, instead of being a stranger in a community, if not hostile, certainly not interested in the outcome of his case.

Care of the tuberculous a community obligation.—The sick have given their years of activity and productiveness, be they few or many, to the community, and when they become diseased and are no longer

able to care for themselves, they have a right to expect the community to do its share and give them such aid and care as their condition requires. In fact it is this underlying thought which prompts the community to care for the sick, and that has been a stimulating factor in the progressive campaign now being waged for county and municipal tuberculosis sanatoria to provide suitable care for this class of unfortunates.

It has been shown that migration to health resorts to secure benefits of climate is applicable to only a favored few, and it has been demonstrated that no necessity for migration exists. Given the essentials for the care and treatment of tuberculosis in the home climate, the sufferer progresses as satisfactorily toward the arrest or cure of his disease here as elsewhere. The victim remains in intimate touch with his family and friends, is contented, and infinitely better off than if he had migrated West, supplied with inadequate funds. Communities are realizing this, antituberculosis societies have been formed, and legislation has been enacted in many States during the last decade providing for State, county, and municipal tuberculosis sanatoria for the care of the tuberculous in their midst. They are also awakening to the fact that it is incumbent upon them to institute remedial measures unless they want to be left behind in the march of progress against this disease. Both the humanitarian and economic phase of the subject are claiming their attention, and it is realized that not only must provision be made for the care and treatment of the tuberculous sick, but also that remedial measures to prevent the spread of the infection and to protect the well must be instituted as a salient feature in the safeguarding of civic economy.

Compulsory segregation.—As the law requiring the report of cases of tuberculosis in Indiana declares this disease to be an infectious and communicable one, dangerous to the public health, and under this definition it might be quarantinable under the provisions of the quarantine act, it has been deemed proper to briefly consider this subject.

There is no question that the segregation of all open cases in properly equipped sanatoria is the most effective measure in combating this disease, and if such were possible rapid strides would be made in reducing tuberculosis to a minimum. However, it is not practicable, and the necessity of such a procedure in many cases is open to question.

In the first place, it must not be forgotten that many persons suffering from tuberculosis are adverse to admitting that they have the disease and endeavor in many ways to conceal this fact, and, furthermore, that quite a percentage of cases in the early stages are not under the care of a physician, consequently, there would be lack of knowledge of many tuberculous individuals belonging to the open

class, and segregation would fail to accomplish the object sought. Secondly, our educational propaganda has not yet reached the point of convincing the masses that such a procedure is necessary and that sanatorium treatment counterbalances the consequent restraint of freedom and separation from family and friends. An attempt to enforce segregation would lead to concealment of cases, sufferers would not consult physicians for fear of being forced into the hospital, and in consequence the very class of cases that would be most benefited by institutional treatment would not be obtained. Furthermore, those that should be under competent medical supervision would be struggling along without that aid in an effort to hide the fact that they were victims of the disease.

Another fact that deserves consideration is that a certain per cent of cases are in families that are financially able to furnish satisfactory treatment at home by providing sleeping lodges in the yard, or sleeping porches, and medical supervision, and are sufficiently intelligent to understand the precautions to be observed and enforced to prevent spread of infection. They would naturally resent being compelled to send a son or a daughter to an institution, and would ask the question, Why is it necessary, if practically the same treatment can be carried out at home?

The segregation of all consumptives would be a stupendous undertaking, and the construction and maintenance of hospitals of sufficient size to furnish such required accommodations for all the tuberculous sick of a community present a financial problem that most county and municipal officials will certainly be reluctant to authorize.

It is believed that the best results can be accomplished at the present time by making the sanatorium so attractive and the beneficial effects of treatment therein so pronounced that its educational influence will so spread that tuberculous sufferers will clamor for admission instead of being sent there against their inclination. Do this, and segregate only those cases that can not and will not be satisfactorily managed at home and whose isolation is necessary to safeguard the health of associates and other members of the family.

Report of cases.—In order to wage a successful campaign against a communicable disease, the first essential is knowledge of the extent to which that disease prevails in the community—when, where, and under what circumstances it is occurring. The physician forms an integral part of any scheme which has for its accomplishment the control of disease. He is the only person in the community who to any extent comes in contact with the sick, and thereby knows of the occurrence of disease. At times he has been so intent on relieving suffering and his interest so centered in the cure of his patient that the possibility of the sick person being a menace to the health of

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others has not been considered; therefore the law requiring the report of certain diseases is to remind him that he owes a duty to the community, and that it is essential for him to acquaint the health officer with such information so that the spread of the disease can be prevented.

A law was recently passed making tuberculosis a reportable disease in Indiana, and so important is the control of this disease to the welfare of the community, and so essential is the knowledge of existing cases for the successful prosecution of any remedial measures that may be instituted, that it is believed compliance with this law will be a pleasant duty, and that in so intelligent a community a true spirit of cooperation in the work will be effected.

Tuberculosis sanatorium.—Having ascertained that tuberculosis is unduly prevalent, and that a large number of the cases can not be advantageously and properly cared for in their homes, the question arises, What shall be done? The answer is a properly equipped sanatorium for the care and treatment of both incipient and advanced cases, thereby curing or arresting the disease in the former and returning the individual a useful member to the community, and by removal of the latter insuring not only peace and comfort to the victim, but also eliminating a dangerous source of infection to others.

Treatment in a competently conducted sanatorium teaches the patient how to live, so that even if he can not remain until complete recovery, he leaves with a knowledge of what he must do to continue on the road to health, the application of which knowledge in his home will complete the progress begun in the institution.

One of the greatest values of sanatorium treatment is the educational influence. Here the patient learns the true value of fresh air and how to obtain it; the true meaning of rest and its application to the treatment of this disease; the interpretation of symptoms as bearing on his affection and the many requirements to effect a cure. Recovery is the sole object for being there, and seeing others on the journey to health and usefulness, he is stimulated in an endeavor to reach the same goal.

This educational influence is not limited to the patient alone, but makes its impress on the community. Friends and relatives visit the patient, note his improvement and progress toward recovery, and see the application of the principles that have wrought this change for the better. The value of fresh air and sunshine is taught, and this ultimately leads to improved conditions in homes.

Having dwelt on the necessity for a sanatorium and the benefits arising from treatment in such an institution, let us now inquire what provisions exist for providing a tuberculosis hospital.

A law enacted in 1913 empowers the board of county commissioners to establish a county hospital for the care and treatment of

tuberculosis, and cause to be erected the necessary buildings for this purpose. It is further provided that the commissioners, with the approval of the county council, can assess, levy, and collect such sums of money as may be necessary for the purchase of site, erection of necessary buildings, and that required for maintenance and operation. Authority is granted to borrow money for the erection of such a hospital on the credit of the county and to issue county obligations therefor.

This act provides for the appointment by the county council of a board of managers composed of four citizens of the county, two of whom shall be practicing physicians. This board appoints the superintendent, fixes the salaries, and directs the general administration of the institution.

Having shown that not only is a tuberculosis hospital necessary, but also that authority exists for the erection of one, it remains for civic bodies and citizens to so present this matter to the county commissioners as to impress them that the construction of such a sanatorium should be commenced without delay.

The site selected should be high and dry, well drained, and such as to insure an abundance of fresh air and sunshine; and the hospital should have ample surrounding grounds and be conveniently located to transportation facilities. This last is essential in order to permit the visiting of patients by their relatives, as this promotes contentment of both patient and family and also extends the educational influence of the sanatorium.

The size of hospital for the use of the entire county, which has approximately 45,000 inhabitants, should not be less than 25 beds as a primary unit. It would seem advisable to construct an administration building ample for a larger institution, or have it so arranged that an extension could be added when the necessity arose. It would also be more economical in the end to build an infirmary for the bed cases a little larger than might be immediately required, as buildings of this type and the administration building will be of more expensive construction, and it seems advisable to make provisions for increase that will soon occur. The wards for the incipient and ambulant cases are cheaply constructed and could be added as the necessity became apparent.

Tuberculosis dispensary.—A dispensary service is absolutely essential to an adequately equipped and conducted tuberculosis campaign. A dispensary furnishes a place where persons who are not feeling well or who suspect that they are suffering from tuberculosis can go to be examined, and where they can receive advice as to the value of fresh air, rest, and the proper procedure to follow in order to regain their health. Case records could be kept of persons applying to the dispensary for treatment, and also of cases reported by phy-

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sicians, so that a card index of all known cases of tuberculosis would be available for the extension of such aid and remedial measures as might be required.

In connection with the dispensary there should be a physician who could visit infected households and give medical supervision to indigent tuberculosis sufferers whom it is impracticable to send to the sanatorium and who are unable to come to the dispensary for treatment.

Nursing service.—There should be a nurse, trained in antituberculosis work, connected with the dispensary who could do follow-up work on the cases in their homes; show the sick person the necessary precautions to take in order to prevent dissemination of infection; teach the value of fresh air, rest, and other essentials in the care of the case; and thereby carry on educational work in the infected household.

The question is often asked whether a sanatorium or a dispensary and nursing service is preferable, and which will accomplish the better results in a small community if only one can be afforded. Opinions differ as to the relative value of the respective services, but for Richmond or Wayne County the question is simplified, because there exists authority for the erection of a tuberculosis hospital and none for the establishment of a dispensary and nursing service, unless the law can be interpreted to permit the conducting of a dispensary as an adjunct to the sanatorium. If this interpretation can not be made, it is desirable that the law be amended so as to authorize the establishment of such dispensaries and nursing service. However, in the absence of specific authority, it seems feasible to establish a dispensary with little expense, by having physicians volunteer their services two hours in the afternoon, once or twice a week, for this purpose, and utilizing the services of one of the nurses of the domestic science organization for follow-up work in the homes.

Home extension benefits.—In some communities the law authorizing the erection of tuberculosis sanatoria has been amended so that some of the benefits of institutional treatment can be extended to tuberculous sufferers in their homes, and this is a wise provision, as it is impracticable for various reasons to receive a large majority of the afflicted in the hospitals. In Richmond the expenses incident to such benefits would have to be borne by public or private charity, but a more worthy cause can not be conceived than the extending of aid to these unfortunates.

The construction of a cheap sleeping porch and the furnishing of extra bedding to those who are unable to buy it for themselves would

not be a heavy burden, and a life spared and a household saved from infection would redound to the credit of the community and furnish an example of benevolence worthy of praise.

Educational.—An educational propaganda is an important measure in combating tuberculosis. Illustrated lectures and leaflets showing the ravages of consumption, correct methods of living, and the precautionary measures to be taken to prevent spread of the disease, reach a certain per cent of the people and accomplish much among the intelligent classes. The most important work of this character is that carried out by the nurse in the household. By careful and painstaking instruction and practical demonstration she will accomplish more among the people who furnish the bulk of tuberculosis victims than any number of slides and any amount of literature.

Disinfection of houses.—The law requiring report of cases of tuberculosis provides that all houses, apartments, rooms, or premises vacated by death or removal therefrom of a case of tuberculosis shall be disinfected, and makes it obligatory for the owner or agent of said house or premises to notify the health officer that such premises have been vacated, and, furthermore, provides a penalty on the owner or agent if such house is rented or allowed to be occupied before it has been disinfected. By disinfection is meant the thorough cleaning of houses in which cases of tuberculosis have occurred. Thorough cleaning of the house by scrubbing, repapering, or repainting, with thorough airing and exposure of rooms to sunlight, is a necessary measure in all premises in which tuberculosis has occurred, in order to combat this disease and protect the well.

Other Departments and Organizations.

In the following chapters brief consideration will be given to the activities of other departments and organizations that have a bearing on the public health of the community.

SCHOOLS.

There are 11 public schools in Richmond—9 elementary and 2 high schools—with a total enrollment of 4,284 pupils, averaging an attendance of 85 per cent of the enrollment. There are also 3 parochial schools, with an enrollment of 750 pupils, giving a grand total of 5,034 students. A college, located in the city, is not taken into consideration.

Building requirements.—A State sanitary school law provides that all school buildings of two stories and over must have a dry and well-lighted basement, with a cement floor, under the entire building, and that the ground floor shall not be less than three feet above the ground level.

The lighting of study rooms must be from one side only, and the window area must be not less than one-sixth of the floor area, and there must be provided not less than 225 cubic feet of space for each pupil.

The heating and ventilation of school buildings are carried out by taking air from the outside and, after heating, introducing it into the different rooms through supply registers located at points not less than 5 feet nor more than 7 feet above the floor; and a system of vent registers and ducts sufficient to exhaust the air in a room at least four times an hour is required. The vent registers are placed on the same side of the rooms as the supply registers. A fresh-air supply of 30 cubic feet per minute per pupil is required.

An inspection was made of seven of the public school buildings, three of which are old buildings and known to be the most unsatisfactory in lighting, heating, and physical arrangement. The window area was insufficient in two and artificial light is required on cloudy days. Four are quite modern, and meet all the requirements of the ordinance and the purpose for which used.

The following pertinent data, furnished by the superintendent of schools, gives in a few words an index of the physical condition of the different buildings: The lighting of the two high schools is satisfactory; that of the nine elementary schools shows the percentage of window area to floor space to be 25, 19, 18, 18, 17, 17, 14, 12, 10; therefore, the lighting is sufficient in eight fair in one, and defective in two.

All buildings are equipped with mechanical supply systems of ventilation, and the air is heated in six by hot-air furnaces, and in five by steam-heat plants. A plenum chamber is used in all buildings and the supply of hot, cold, or tempered air is regulated by automatic thermostats in each room in all buildings, except one. All buildings also have vent registers and ducts installed. An investigation was made during the last session and it was ascertained that the cubic capacity per pupil, based on average attendance, was sufficient, the lowest being 223 cubic feet and reaching as high as 342 cubic feet.

Sanitary drinking fountains are installed in all school buildings, and in only one instance are the toilets located in the basement.

Medical inspection of school children.—Under authority of a State law a medical inspection of school children was instituted in 1912, and two physicians are employed for this purpose. This inspection service is under the direction of the school trustees, and the compensation of the medical inspectors, who are part-time officials, is paid out of the appropriation for the maintenance of public schools.

Methods of procedure.—Examinations are made of all pupils, including the eighth grade, and upon enrollment a pupil is given a

physical examination in order to determine if any defects exist. A card, which is the same form as that recommended by the National Bureau of Education, is prepared for each pupil examined, and on it are noted the general physical condition, defects, and diseased condition of organs of the child examined. The history relative to having had diseases incident to childhood is ascertained and is also noted. There is space on this card for recording in detail the scholarship record of the pupil.

This card is filed at the school the child attends, and when subsequent physical examinations are made all pertinent data are added; and as it follows the pupil through the school period, a reliable index is furnished of not only the physical condition but also of the mental progress of the child. Physical defects are noted on the card according to degree of gravity, and when they are sufficiently severe to require the application of remedial measures a notice is sent to the parents of the child that an examination showed a diseased condition that should receive treatment and advising that the child be taken to the family physician for this purpose. A duplicate is retained and check is made to determine whether treatment has been instituted.

When a child is found suffering from a communicable disease or other condition requiring exclusion, a notice is sent to the parents giving the cause for exclusion.

The public schools are visited every second day, and all new pupils and those referred by the teachers are examined. The medical inspection service has not yet been extended to the parochial schools. Parents' consent cards are not a necessary prerequisite for the physical examination of pupils. Upon the completion of the day's work the medical examiners make a summary of the pupils examined and excluded and of notices sent to parents relative to physical defects requiring treatment. This is sent to the superintendent of schools.

Vaccination is not compulsory; but if the medical examiner has reason to believe that pupils have been exposed to smallpox, they can be excluded from school unless vaccination is permitted.

School nurse.—There is no provision in the law authorizing the employment of a school nurse, and school hygiene is seriously handicapped in this particular. The medical examiners and the school authorities realize the urgent need of a nurse to do follow-up work in families in which medical treatment has been advised for the child, assist in examination of pupils, apply simple dressings, and perform the general duties that fall within the province of school nurses. It is recommended that one nurse be secured as soon as practicable.

Dental clinic.—The value of a dental clinic as an adjunct is so pronounced and the benefits derived from furnishing dental service

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to indigent pupils are so productive of good that it has been deemed advisable to call attention to the subject.

The schools in Richmond are still further handicapped by lack of provision for a dental clinic, but it is believed that it might be possible to start a clinic by providing the necessary equipment out of the school funds and by securing the cooperation of the local dental surgeons for the necessary service.

Open-air school.—There is no open-air school or room established in Richmond, and it would seem that in the number of pupils attending the public schools there are a sufficient number with tuberculosis in a quiescent stage to justify the operation of at least an open-air room. The advantages of such an establishment have been fully demonstrated not only in tuberculous children, but also in those that are anemic and underdeveloped. It might be feasible to establish such a school through the cooperation of one of the civic organizations with the school authorities, the former furnishing the necessary extra clothing, food, and nurse, and the latter the room, books, and teacher.

Work accomplished—Session 1914-15.

Visits to schools.....	1, 126
Regular examinations.....	2, 957
Special examinations.....	3, 271
Pupils excluded.....	191
Pupils recommended for treatment.....	1, 361

The following shows the result of examinations:

Total examined.	Organs.	Reported defective.	Per cent defective.	Per cent of defectives receiving treatment.
2, 358.....	Eyes.....	95	4	46.2
2, 358.....	Ears.....	53	2.2	18.9
2, 358.....	Nose.....	135	5.7	20.
2, 358.....	Throat.....	759	3.2	14.6
2, 358.....	Teeth.....	1, 155	48.8	22.8
2, 358.....	Glands.....	736	3.1	5.6

VISITING NURSE.

There are a number of womens' clubs in the city which are administered through an executive committee composed of one member from each club. One of the most important of these is the Domestic Science Club, which inaugurated a nursing service in January, 1914. Although the primary object sought to be obtained by the employment of a nurse was to render aid to those sick, who were unable to secure proper care, which deals more with the cure of illness than the prevention of disease; still, certain public-health functions are so

intimately intermingled with the nurse's work in the household that such a service is not only of great benefit to suffering humanity, but also of great value in relation to the public health of the community. This is an important step and performs a work of lasting benefit to the community. The public-health features should be emphasized, and careful instruction in personal hygiene, correct mode of living, and the family's obligation to neighbors and the community given in every household visited. The highest aim of preventive medicine can be achieved only by the education of the individuals of a community in personal hygiene for the preservation of health in the family unit, and by inculcating a high standard of obligation for the prevention of the spread of disease to one's neighbors. The public-health nurse is the great factor in this much-needed educational campaign, and on account of intimate contact with the family, she is the one agent most capable of giving instruction to those that most need it.

Although this service has been in operation only 18 months much good has been accomplished, and the wisdom of its inauguration has been amply proven. While the care of the sick and the relief of suffering are commendable and are the work that attracts more immediate attention, it must be borne in mind that the most lasting benefit of such a nurse's activities is the education of the individual in order to prevent disease. The care of communicable diseases, instruction in cases of tuberculosis, for the benefit of the patient and the safeguarding of others from infection, and infant welfare work, are such important activities in saving life and protecting others in the community that the public-health features of this work should be extended as much as possible, and must constitute an essential part of the nursing service.

As already stated, the principal function of this service is the nursing of the indigent sick, and such patients are referred to the nurse by physicians, Social Service Bureau, and relatives or other members of the family. All classes of diseases are cared for, aid is given in maternity cases, and a limited amount of prenatal and infant welfare work is done. Visits are made as often and as long as necessary, generally daily, but twice a day when the patient is very ill. Infants that come under the care of the nurse are followed for a year, and visits are made sufficiently often to ascertain whether instructions are being carried out and the child is progressing satisfactorily.

Patients are expected to make such small payments for the services as they are able to make, and the nurse ascertains the financial status of the family by obtaining its social history. However, as only \$14.35 was collected for nursing 191 persons during 1914, it will be seen the benefits were extended to a class unable to procure

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the necessary care for themselves. The nurse instructs some member of the family or a relative how to care for the patient during her absence, prescribes the diet, and teaches personal hygiene in the household.

Only one nurse was engaged in this service until March 15, 1915, when an additional one was employed, so there are now two available for this field work.

The work accomplished in 1914 was as follows:

Patients nursed.....	191
Maternity cases receiving aid.....	27
Infants under 1 year receiving care.....	29
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Home visits made.....	1,369
Social visits paid.....	253
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Total number of visits.....	1,622

The amount of work is gradually increasing, as shown by the number of visits for three months of 1915, as follows: April, 211; May, 146; June, 347.

DAY NURSERY.

The Domestic Science Club equipped and opened a day nursery on April 15, 1915. As it had been in operation only three months at the time a study was made, it is difficult to forecast to what extent it will be patronized, but as its benefits become more fully known it should serve a useful purpose in the community. It is equipped for caring for 15 children at one time, and a nominal per diem charge is made of sums varying from 5 to 25 cents. The children are received for the day and are kept over night only in cases of emergency. They are bathed and given lunch in the afternoon before being taken home. Mothers are instructed in the care of their children and beneficent results have already been accomplished in specific instances.

Twenty-five different children have received care in the nursery and there has been an average attendance of three a day, the highest number having been six. The majority received are of ages from 15 months to 3 years, but children to 6 years of age are taken.

Public health committee of the Commercial Club.—This committee of the Commercial Club is quite active in a campaign for improvement and extension of public-health activities. One member is engaged in studying the collection and disposal of garbage, another is active in stimulating a campaign against flies, and all the members have taken an active part in the study of the tuberculosis problem and the necessity for a county tuberculosis hospital as the first step in instituting remedial measures for the control of this disease.

Attention is given to educational propaganda, and films illustrating certain phases of sanitary work and demonstrating the life history of the fly and the measures for its eradication, and similar subjects, are secured and by arrangements with the managers of the motion-picture theaters shown during the regular evening entertainment.

Social service bureau.—This bureau was organized in 1914, and is under the direction of a full-time paid secretary, experienced in social-welfare work. The main object of this bureau is to systematize charity work in Richmond, stimulate interest in the welfare of the poor, and interest the women of the community in the better care of babies in their homes, and the bringing about of active co-operation between all benevolent organizations. Investigations are made of the conditions of families applying for relief, and reference files are kept of those receiving aid from the bureau.

An affiliation exists between the bureau and the following organizations: Domestic Science Club, Associated Charities, Tuesday Aftermath Society, Wayne County Antituberculosis Society, and the township trustees' work. The bureau has compiled and charted statistics covering the deaths from tuberculosis in Richmond for a period of six years, and has been active in arousing public interest in the tuberculosis problem.

The bureau is supported by funds raised by voluntary contributions, and expends annually about \$6,000.

Disposal of Sewage.

Nearly all the sewers empty into the Whitewater River, and although there is heavy pollution of the water of this stream there is sufficient volume and current to handle the sewage satisfactorily and obviate any nuisance. The sewage from a small section in the southwest portion of the city is more economically treated by use of sewage beds, and this method of disposal is carried out for that district. Four small beds are in use, so that ample periods of rest can be given, and examinations of the effluent have shown that efficient operation is being carried out.

Sewerage system.—There are 48 miles of sewers in the city, and except in a few small outlying districts mains and laterals are quite well distributed, and sewers are available for 90 per cent of the houses in the city. A very satisfactory system has been installed, and it receives both the household waste and the surface water from the streets.

Although sewers are available for 90 per cent of the houses, only about 65 per cent are connected. Attention has already been called to the imperative need of modern plumbing in a relatively large

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per cent of the houses in the city, in order to abolish cesspools and surface privies, which constitute a menace to public health and "must go" if Richmond is to reach the same high standard in the conservation of the health of its citizens that its progressiveness has made for it in other particulars. In this connection it is proper to again emphasize the necessity for the enactment of an ordinance compelling householders to install modern plumbing and connect with the sewer when it is accessible.

In the larger portion of the city the sewers have been located in the alleys and as the houses are built on the front portion of the lot, a long house drain is often necessary. In some of the older homes, therefore, in the less fashionable residential section, economy has been effected at the expense of efficiency, and a crude water-closet has been placed in the yard near the alley instead of the installation of baths and toilets in the house.

This yard closet is in reality a small cesspool, which is connected with the sewer on one side and receives the waste water from the slop sink through a house drain on the other. This drain pipe is trapped at the sink and vented and trapped at a point midway between the sink and closet. The privy erected over the opening is not fly proof, and there is always present fecal matter to which the flies have access. These yard closets do not meet sanitary requirements and should be abolished.

Plumbing.—The city is sadly derelict in this particular. It has no plumbing code and no inspector of plumbing. A plumbing permit is required when a connection is made with the sewer, but the installation of fixtures is left to the plumber's judgment and is a matter that rests between him and the owner of the premises, and there is no official supervision and testing of the work done. This condition of affairs should be immediately remedied by the enactment of a plumbing code and the appointment of an inspector of plumbing.

Water System.

The city water supply is "ground water," which is furnished from a number of filtration galleries and two large springs, located at points 3 and 5 miles, respectively, from the corporation limits. The filtration or collecting galleries have an aggregate length of about 2,500 feet; they are connected together and the water flows by gravity to a large suction well, where the pumps are installed. The water from the two springs is also taken to this well by siphonage.

The daily consumption of water is 110 gallons per capita, approximately 2,700,000 gallons a day. The present supply is capable of furnishing 4,000,000 gallons daily, which is ample, unless an extensive conflagration should occur; then it might become necessary to meet

the emergency by taking water from a branch of the Whitewater River. This latter should not occur if it could possibly be avoided on account of the pollution of this stream with sewage.

A storage reservoir, having a capacity of 10,000,000 gallons, has been constructed at an elevation to give a static pressure of about 65 pounds in the city mains. The reservoir is kept filled so as to furnish a reserve supply.

The pump installed at the suction well supplies most of the water in the mains by direct pressure.

The water is hard but potable, and constitutes a safe supply. No treatment of the water is carried out.

Control of the Construction of Buildings.

The authority for control of buildings undergoing construction, repairs, or alterations is provided by the State housing law and the building code of Richmond, and supervision is carried out by a building inspector.

The State housing law relates especially to tenement houses, and its requirements constitute an important step toward improved housing conditions. This law is full and specific and is one of the most important public-health measures enacted in recent years. It gives the health department power to prevent overcrowding, so that there will be not less than 400 cubic feet of air for each adult and 250 cubic feet for each child under 12 years of age, occupying any room in a tenement house.

Ordinance requirements are briefly as follows:

A tenement house is defined as a building designed and arranged for or occupied by two or more families, living independently, and having a common right in halls, stairways, yard, cellar, and water-closets.

Tenement houses alone or with other buildings must not occupy more than 85 per cent of the lot area on corner lots nor more than 65 per cent of the area of interior lots.

The height of a new tenement house must not exceed $1\frac{1}{2}$ times the width of the street upon which it abuts, and those constructed of wood shall not exceed 2 stories in height.

Yards on lots where tenements are constructed must extend the entire width of the lot, and be not less than 25 feet deep, measured from the rear-lot line, nor less than 10 feet deep when the lot is less than 100 feet deep, and that on corner lots shall be 15 feet deep.

Size of courts proportionate to the height of the buildings is prescribed, and the courts must be open and free from obstruction.

Every room, including bath and water-closet compartment, must have a window opening directly on a street, alley, yard, or court. The window area shall be not less than one-seventh of the floor area, and windows for bathroom and closets shall be not less than 6 square feet. Windows must be so constructed that the upper half can be lowered.

In every apartment there shall be one room having a floor area of not less than 150 square feet, and in each other room the floor area shall not be less than 100 feet. The height of rooms, from floor to ceiling, must be not less than 9 feet.

The size and lighting of halls and construction of stairways are prescribed.

Living rooms in cellars are prohibited. Basement rooms must be 9 feet from floor to ceiling, and the latter not less than 4½ feet above finished grade of the lot. Every such room shall be an integral part of an apartment, having windows opening directly on street or alley. Tenement houses must have either a cellar, excavated to a depth of not less than 3 feet with proper damp-proof walls, lighted and ventilated, or be elevated above the ground 2 feet, in order to afford a free circulation of air.

Tenement houses are required to connect with the sewer when it is accessible, and there shall be installed one water-closet and one sink in each apartment.

Local ordinance.—Provisions are made for the appointment of a building inspector and the powers and duties of that employee are prescribed.

The ordinance provides that persons desirous of erecting, altering, or repairing any building in the city of Richmond must first secure a permit from the building inspector.

Copies of plans and specifications of the building shall be filed in the office of the inspector until completion of the building or structure in question.

Permits are also required for the installation of wiring and heating apparatus.

The ordinance fully prescribes depth of excavation beneath the house, the construction of foundation walls, materials used, and methods of construction of the building.

Regulations and requirements governing the construction of chimneys, installation of furnaces and heating plants, and electric wiring of buildings are fully set forth.

Inspection service.—The local building code and the State housing act provide adequate and satisfactory regulations governing the construction, alteration, and repair of buildings and furnish the inspector with the necessary authority to insure satisfactory housing conditions.

He has the power to stop construction when the building is not being erected in accordance with the plans submitted, and, furthermore, is authorized to cause the vacating of buildings and their demolition when they are unfit for human habitation or otherwise a menace to life and health. An examination is made of the plans and specifications submitted, and if found satisfactory, a building permit is issued, but in event changes are required the permit is withheld until they have been made.

The first inspection includes the cellar, trenches, and foundation walls, and subsequent ones supervise the framework and general construction, including also the installation of heating apparatus and wiring for electric current.

A permit must be secured from the building inspector for wiring and the installation of heating apparatus, but none is required for plumbing.

Attention has already been called to the unsatisfactory construction of many cellars, and even in houses now being built it is not obligatory to cement the cellar, it being left to the option of the owner whether this is done. In the majority of the better class residences, built in recent years, the cellar has been cemented, but it should be a requirement in all cases.

Expenditures of the health department, Richmond, Ind., during 1914.

Salaries:

Secretary board of health.....	\$499.99
Other members.....	119.00
Dairy inspector.....	1,000.00
Meat inspector.....	840.00
Sanitary inspector.....	838.50
Sundry expenses.....	1,403.50
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	3,800.99

Garbage disposal:

Salary superintendent of incinerator.....	720.00
Coal.....	500.16
Collection of garbage.....	5,560.25
Miscellaneous.....	415.81
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	7,196.22

Grand total.....	10,997.21
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Conclusions and Recommendations.

As a result of the study the following conclusions may be drawn and certain recommendations are justified:

1. A full-time health officer is necessary in order to place public-health activities on the plane which their importance demands, and it is recommended that every assistance be given toward effecting the passage of a law authorizing full-time county health officers.

2. The reporting of communicable diseases does not embrace all the cases occurring. Improvement in this particular is desirable and no doubt can be effected by securing closer cooperation of the physicians.

3. Proper supervision is not given to the quarantine of cases of communicable diseases, and it is recommended that this procedure be placed on a more up-to-date method by isolation of patient with an attendant, so that other members of the family could be released.

4. The employment of a public-health nurse is recommended for exercising supervision over quarantine, giving instructions in the care of excretions of the patient, proper disinfection, and for follow-up work in such communicable diseases as typhoid fever and tuberculosis.

5. The control of the milk supply is under the supervision of a competent inspector. The dairies are in the main in good condition and under an efficient inspection service.

6. It is recommended that samples of milk for chemical and bacteriological examination be taken at more frequent intervals and that the results of the examination be published; also, that milk depots be scored.

7. Inspection of meat and foodstuffs is satisfactory. The bakeries are in good condition and the protection of bakery products from contamination by dust and flies is receiving due care.

8. There are a large number of privy vaults that should be abolished, and it is recommended that an ordinance be enacted compelling property owners to install plumbing in their houses and connect with the sewer when it is accessible.

9. It is recommended that privy vaults required as a temporary expedient be made fly proof, and that the necessary regulations to that end be promulgated and enforced.

10. Recommendation is made that the ordinance requiring fly-proof manure boxes be more strictly enforced and that the campaign in this respect be vigorously prosecuted.

11. The equipment for garbage collection is not satisfactory, and efficiency would be increased by procuring dump wagons for this work.

12. A case ratio of 6.95 cases to each death from tuberculosis was determined by a house canvass.

13. The tuberculosis incidence in Richmond, based on the death rate from this disease, corresponds closely to that of the "registration area" and that of the State of Indiana.

14. The occurrence of tuberculosis in Richmond corresponds to the general rule, and the majority of the cases are found where housing conditions are unsatisfactory and among the less financially able.

15. Many instances of the spread of tuberculosis through infection of house environment were noted during the canvass, and several families have been practically destroyed in this way.

16. Although the tuberculosis incidence in Richmond is not unduly high, still the disease is sufficiently prevalent to become a matter of concern to its inhabitants and to necessitate the institution of remedial measures.

17. The care of the tuberculous is an obligation of the community, and as those afflicted with tuberculosis have given their years of activity and productiveness to the community, they have a right to expect such aid as their condition requires.

18. The segregation of all open cases of consumption in properly equipped sanatoria would be the most effective measure in combating

this disease, and, if possible, rapid strides would be made in reducing tuberculosis to a minimum.

19. A most important remedial measure is a local tuberculosis sanatorium for the care and treatment of the tuberculous. It is recommended that a county tuberculosis hospital be erected at once.

20. It is recommended that the medical superintendent of the tuberculosis hospital be a full-time official.

21. A tuberculosis dispensary service is essential to an adequately equipped and conducted antituberculosis campaign, and the establishment of one in Richmond is recommended.

22. School hygiene is defective, as no provision exists for employing a school nurse. It is recommended that a nurse be obtained as soon as practicable.

23. A dental dispensary in connection with schools is an important provision, and it is recommended that steps be taken to establish one.

24. It would seem that an open-air school or room would be advisable, and consideration of this subject by the school authorities is recommended.

25. The public-health features of the visiting nurses' work should be more fully emphasized and personal hygiene taught in all households visited.

26. There is urgent need for a plumbing code and supervision of plumbing installations, and the enactment of a code and the appointment of an inspector of plumbing are recommended.

27. It is recommended that when the water system is accessible all premises so located be compelled to connect and that wells on these premises be filled and abolished.